his issue: 2-Spindle Tooling • Milling Fixtures • Automatic Dies

e Magazine of

AUGUST, 1952

TOOLING and PRODUCTION

TOOL & DIE JOURNAL

would you pay $1000

for this BALAS COLLET?

BALAS also makes:

- Solid Collets
- Special Collets
- Master Collets
- Squirrel Cage Pushers
- Master Pushers
- Feed Fingers

This collet costs only a small amount of money and is a relatively inexpensive part of your production equipment. Yet the quality and rate of your production is vitally dependent upon it.

If your machines cannot operate at top efficiency... if your scrap losses are mounting... the installation of just one Balas Collet might easily be worth $1000 to you in profits!

Balas Collets are machined to exact tolerances from selected steels, properly heat treated and rigidly inspected to insure greater accuracy and longer life. In addition, all Balas Collets are cam-ground on the taper to a special "Cloverleaf" shape. This permits faster opening and closing, prevents "sticking" of the chuck and reduces chatter.

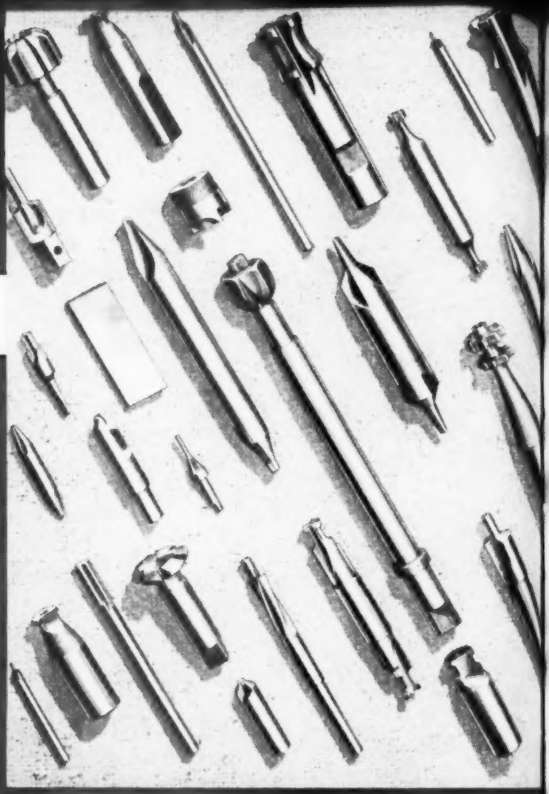
You can produce better work and get longer runs with Balas Collets yet they cost no more than ordinary ones. Ask for them by name.

BALAS COLLET MANUFACTURING CO.

5883 EAST 27th STREET CLEVELAND 14, OHIO

WORLD'S LARGEST MANUFACTURER OF COLLETS EXCLUSIVELY

FINE-EDGE CUTTERS



Want high

Edge Strength?

You can get it

with DBL-2 HIGH-SPEED STEEL

Write for copy of

"CUTTING TOOL MATERIALS"

Allegheny Ludlum produces *all* types: the various tungsten and "moly" high-speed steels, cast-alloy materials, and cemented carbides. This 36-page booklet analyzes and compares types, and covers grade selection, etc.—invaluable data for production men. *Write for your copy.*

ADDRESS DEPT. TD-32

A midwestern tool manufacturer, specializing in fine-edge cutting tools, has found DBL-2 *best* for their purpose—added proof of the high edge strength and excellent cutting qualities of this high-speed steel.

DBL-2 (typical analysis: C.80, W 6.00, Mo 5.00, Cr 4.00, V 1.75) represents the 6-6-2 or M-2 type of tungsten-molybdenum high-speed steel. DBL-2 combines high hardness with toughness. Requiring no more than reasonable care in hardening and tempering, you will find it a high-speed steel of great possibilities—capable of giving you performance equal to, or better than, the general-purpose tungsten types, and at reduced cost.

DBL-2 reliability has been proved in a wide variety of cutting tools. Let us help you to use DBL-2 . . . our Mill Service Staff is at your command.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

AL FINE TOOL STEELS SINCE 1854

W&D 3639 B

Putnam *adds* more so you can *remove* more—easier. Extra operations are added to normal practice in grinding end teeth, so you can be certain of non-clogging, free cutting. The special relief thus produced by Putnam eliminates chip-trapping pockets, tends to force chips out.

For the best in end mill performance, specify Putnam—made by end mill specialists.

PUTNAM
TOOL COMPANY
2985 CHARLEVOIX AVENUE · DETROIT 7, MICHIGAN

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

The Magazine of

TOOLING and PRODUCTION

TOOL & DIE JOURNAL

1975 Lee Road ● CLEVELAND 18, OHIO
FAirmount 1-4040

CONTENTS

Vol. XVIII, No. 5 August, 1952

Editorial INDEX	56
Editorial	59
Publication Previews	120
Shop Aids	144
Inform-A-Gram Card	151
Progress-on-Parade	172
Quick Pic	186
Contract Tooling and Production	196
Advertisers Index	198

Member of CCA

TOOLING and PRODUCTION is published monthly for plant operating and purchasing executives and department heads in 50 types of end product and contract manufacturing companies.

Every copy is directed to such an individual by name, by title, and by company gratis. See CAA certification.

These men, from whom emanate recommendations, requisitions and orders for needed materials, tools, equipment and accessories, comprise the Cycles of Buying Influence within their respective plants—CBI—and it is they who constitute TOOLING and PRODUCTION'S ever-vital reader circulation.

U. S. rate of subscription for schools, libraries, and individuals other than above, $6.50 per year. Foreign subscription $10.00 per year. Single copy $.75.

EDITORIAL STAFF

E. WILLARD PENNINGTON.....Editor
C. F. BENNER.....Assistant Editor
W. N. NORDQUIST.....Technical Editor
M. A. L. WEBSTER.....Editorial Assistant
A. H. EHLERS.....Contributing Editor

BUSINESS STAFF

G. J. HUEBNER.....Publisher
R. L. HUEBNER.....Sales Manager
B. C. JACKSON.....Research Manager
R. R. SCOTT.....Production Manager
E. C. JOHNSON.....Circulation Manager

HUEBNER PUBLICATIONS, INC.

GEORGE J. HUEBNER.....President
RAY L. HUEBNER.....Secretary
RUTH R. HUEBNER.....Treasurer

Publishers of

Tooling and Production ● Die Designing and Estimating ● Plastics Molds ● Thompson Materials Weight Tables ● The Know-How-Library of Tooling and Production.

Copyright 1952
by Huebner Publications, Inc.

Acceptance under section 34.64,
P.L. and R., authorized

REGIONAL REPRESENTATIVES

ALTADENA, CALIF., M. D. Pugh, 2721 N. Marengo Ave., SYcamore 7-2004
CHICAGO 1, William O. Dannhausen, 333 N. Michigan Ave., FRanklin 2-4811
CINCINNATI 5, OHIO, Harold W. Haskett, 742 Elberon Ave., GRandview 4323
CLEVELAND 18, R. L. Huebner, Jerry J. Miller, 1975 Lee Road., FAirmount 1-4040
DETROIT, 2, R. F. Pickrell, 314 Stephenson Bldg., TRinity 1-0790
NEW YORK 17, H. Thayer Heaton, 141 East 44th St., MUrray Hill 2-1447

Ex-Cell-O builds a complete line of tool grinders for sharpening high speed steel, cast alloy, and carbide tools. All are double-end grinders with generously proportioned tool rest tables, and all are equipped for face grinding on cup type wheels. For accurate finishing of small tools or for fast metal removal on large tools there's an Ex-Cell-O Tool Grinder to suit your needs. They are described and illustrated in Bulletin 46262. Write to Ex-Cell-O in Detroit today for your free copy. No obligaton, of course.

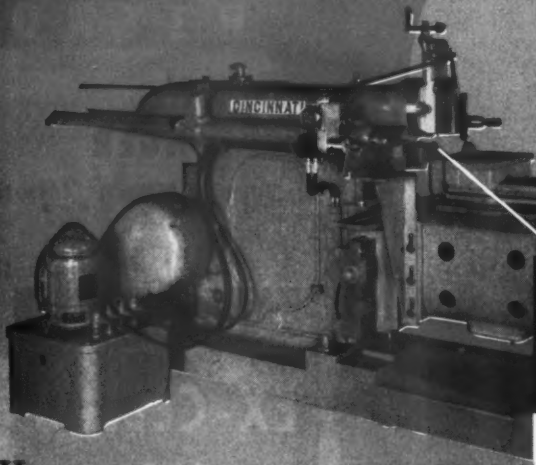
51-3

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Do STANDARD SHAPING *and* AUTOMATIC DUPLICATING

on the *same* CINCINNATI SHAPER



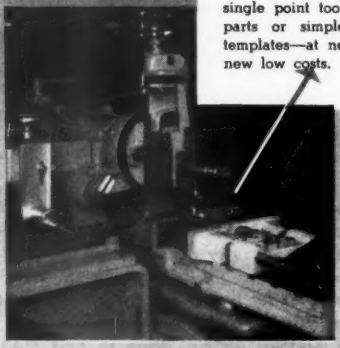
The powerful Cincinnati Magnetic Clutch and Brake—controlled with a finger touch—starts and stops the ram instantly, and speeds production.

YOU can change from Standard Shaping to Automatic Duplicating without a hitch on this hydraulic follower-equipped Cincinnati Shaper. The duplicating mechanism does not interfere with standard shaping operations.

The new Electro-Magnetic Clutch and Brake also brings greater ease of control and greater speed in operation.

A Cincinnati Shaper is the handy man of industry and will be versatile and profitable in your shop.

Write for Automatic Contour Duplicating Bulletin DN-1 and Catalog N-S.



You can duplicate parts with a single point tool, using actual parts or simple sheet metal templates—at new speeds and new low costs.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

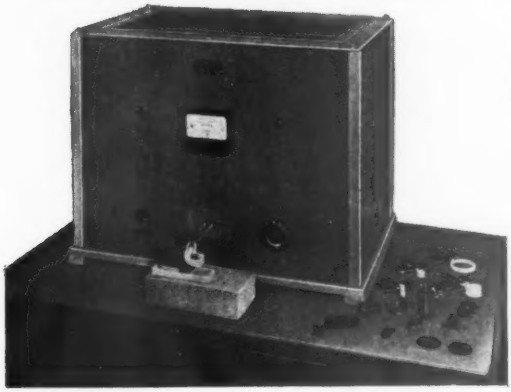
Lepel presents

A Low Cost PORTABLE

HIGH FREQUENCY

Induction

HEATING UNIT



BRAZING

Permits widest choice of silver or copper brazing alloys from lowest to highest melting points. Ideal for brazing carbide tips.

HARDENING

Heat localized exactly where wanted at desired temperature. Ideal for gears, cams, bearing surfaces, cutting tools and other areas that are subject to wear.

SOLDERING

Speedily and neatly performs intricate soldering applications with or without the use of pre-formed rings.

ANNEALING

Ideal for annealing, stress-relieving, normalizing or pre-heating selected areas.

MELTING

Readily melts quantities of ferrous and non-ferrous metals in either graphite or ceramic crucibles.

- **SMALL AND COMPACT** Conveniently operated on bench or table—no mounting necessary.
- **ECONOMICAL OPERATION** No special power installation required. Operates on 110 volts, 60 or 50 cycle line at unity power factor.
- **FULLY GUARANTEED** Guaranteed for continuous duty cycle and stated performance.

This versatile unit is priced so low that every shop may now take advantage of modern induction heating techniques to improve quality and to increase production. Its simplicity of operation eliminates the need for skilled personnel.

The Lepel Model 2 KW will meet the requirements of machine shops, toolrooms, research laboratories and educational institutions. It is especially suitable for hardening, brazing and soldering small parts of either ferrous or non-ferrous metals.

Complete unit with line connection and load coil.

$870.
f.o.b. factory

WILL HEAT TO 1500° F.

⅛" steel rod 1" length in approx.	1 second
¼" " " " " "	3 seconds
½" " " " " "	15 seconds
1" " " " " "	60 seconds

Will melt 4 ounces of brass or steel in 4 minutes.
Equally well suited for heating of non-ferrous metals.

LEPEL HIGH FREQUENCY LABORATORIES, INC.
55th STREET and 37th AVENUE, WOODSIDE 77, NEW YORK CITY, N. Y.

WRITE FOR LEPEL CATALOG TD-8

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

They're TUNGSTEN CARBIDE

They're PRECISION GROUND-FROM-THE-SOLID

Quality Engineered

BURS, REAMERS, END MILLS
BORING BITS & TOOLS
AND OTHERS BY ATRAX

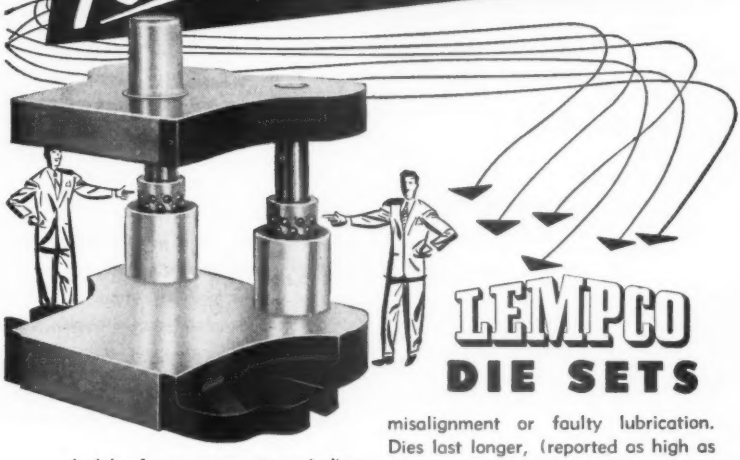
THE
ATRAX
COMPANY

NEWINGTON IN CONNECTICUT

Write for our complete catalog *NOW!*

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

FORGET LUBRICATION TROUBLES!



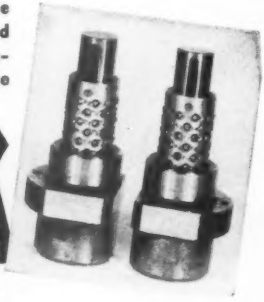
LEMPCO DIE SETS

A dab of cup grease at regrinding time lubricates pins and bushings for hundreds of thousands of strokes without further attention.

No frozen bushings, scored pins, pulled shanks or die damage due to misalignment or faulty lubrication. Dies last longer, (reported as high as 185% more pieces between grinds,) close more accurately, produce pieces with cleaner edges and less scrap. For literature, write to Lempco Products (Industrial Division), Bedford, Ohio.

One way of keeping the cost down is to achieve production performances as yielded by these pins and bushings in Lempco Die Sets—1700 strokes per minute for over 2½ years—a remarkable performance record.

Actual photograph of pins and bushings after 500,000,000 strokes



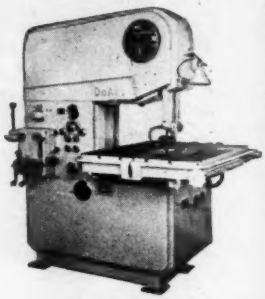
DIEMAKERS Save 15 minutes out of every 60 minutes in die assembly — specify LEMPCO DIE SETS

LEMPCO PRODUCTS, INC.
INDUSTRIAL DIVISION BEDFORD, OHIO

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

YOU CAN BENEFIT FROM

Use the DoALL method for fast low cost machining. Shape and save all types of material. Release larger expensive tools for more profitable operations.



DoALL CONTOUR-MATIC—Finest, most useful band machine built. Variable tool speed 40 to 10,000 feet per minute. Saws, files, polishes, grinds, hones, slices all materials. Hydraulic operation.

DoALLs PAY IN

WHATEVER your band machining requirements, you can find the right model in the DoALL line. There are standard machines to meet almost every conceivable requirement; seven frame sizes; five throat sizes; speeds from 40 to 15000 f.p.m.

There is a fixed speed, 16" *Utility* machine for only $350. There is a combination bandsawing, filing and polishing *Utility* model with dual variable speed and attached saw blade welder for only $750—*the biggest bargain available anywhere in a band machine.*

There are the big, high speed DoALL *Zephyr* machines, to handle work loads weighing a ton or more and with Hydro-Feed tables for fast, la-

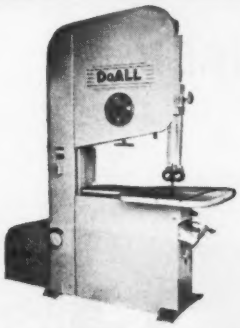
PRECISION SURFACE GRINDERS

GAGE BLOCKS

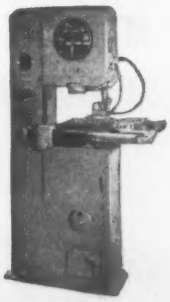
GAGING EQUIPMENT

MOBILE INSPECTION

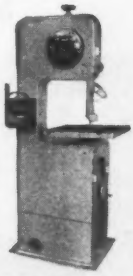
DoALL BAND MACHINING!



DoALL "ZEPHYR" MACHINES—For safe high speed sawing, up to 15,000 feet per minute. Widely used for Friction Sawing. Single or variable speed —16" to 60" throat capacity.



DoALL CONTOUR MACHINES—For precision bandsawing, filing and polishing in every metal working shop. 16", 26", 36" or 60" throat capacity with work height under guides as required.



DoALL "UTILITY" MODELS—Light duty low cost bandsawing machines. Fixed speed for plastic or woodworking—variable speeds for metal sawing, filing or polishing.

ANY SHOP . . . . PRICED AS LOW AS $350

bor-saving production.

The DoALL *Contour-matic* is unmatched in operational scope, quality of work and productivity.

DoALL *Contour* machines are work horses of the metal shop, handling hundreds of cutting jobs with accuracy and speed.

And, there are special production machines built to order for high output on your special applications.

Call your local DoALL Sales-Service Store or write for *free demonstration* in your plant.

The DoALL Company
254 N. Laurel Ave., Des Plaines, Ill.
ASK FOR CATALOGS

B-155

BAND TOOLS FOR EVERY PURPOSE—The right band for sawing, slicing, filing, grinding, honing, polishing every material. Blades for all makes of band machines. Ask for literature.

38 Sales-Service Stores in North America

DoALL

SAW BLADE WELDERS

BAND FILERS

BENCH FILERS

TOOL GRINDERS

TOOLMAKER'S LATHES

TOOL STEEL

Progressive

SCREW MACHINE DEPARTMENTS STANDARDIZE

with

HARDINGE

Collets - Feed Fingers - Pads

for

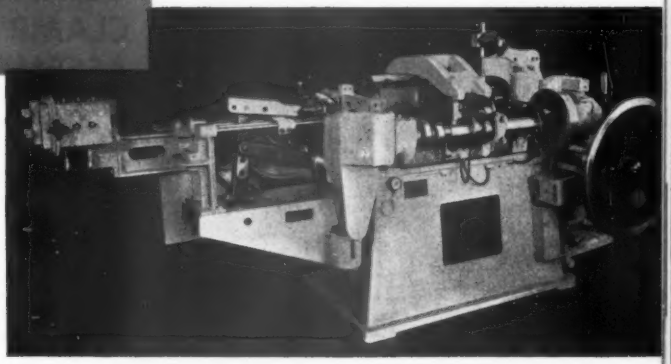
All Automatics, Turret Lathes,
Tool Room Lathes and Millers

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

Eliminate Secondary Operations —— Reduce Costs



Blanking*

Piercing*

Trimming*

Swaging*

Coining*

Forming*

*Produce parts requiring any or all of these operations complete at one stroke of the U. S. Multi-Slide

To meet competition today manufacturers must closely control costs. Secondary operations, inspections and handlings must be eliminated wherever possible. In the production of precision formed stampings from coil stock, the U. S. Multi-Slide ® can effect substantial savings because it completes a finished part at each stroke of the machine. Many different types of parts which would ordinarily require costly secondary operations can be profitably produced. An since parts are produced complete—uniformly and to close tolerances—the number of inspections is also reduced.

The illustration above shows a typical part which is produced complete in the No. 33 Multi-Slide. This machine has a capacity for material up to 2½" wide. If your program involves the production of precision stampings, investigate its labor-saving, time-saving features. Ask for a copy of Bulletin 15-T containing complete specifications.

® Trade Mark Reg. U. S. Patent Office

US PRODUCTS

U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides—U. S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

STANDARDIZE

on

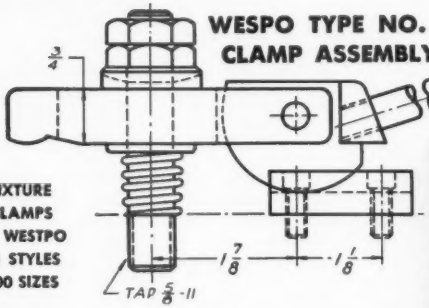
WESPO

CLAMPS and FIXTURE PARTS

Template Drawings of all Clamps and Parts sent on request.

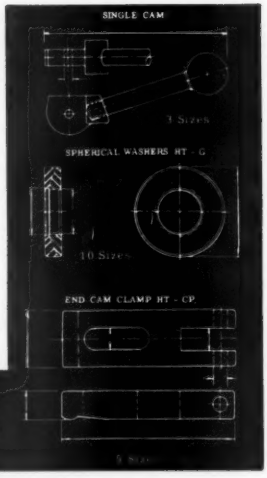
Order COMPLETE CLAMP ASSEMBLY or any COMPONENT PARTS

WESPO TYPE NO. 1 CLAMP ASSEMBLY



BELOW—PARTS OF TYPE No. 1

FIXTURE CLAMPS BY WESTPO 15 STYLES 100 SIZES

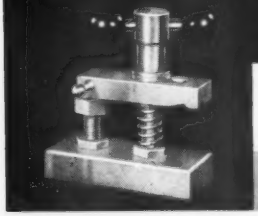


WESPO Clamps are carefully designed to meet the needs of Fixture Designers—Tool Makers—Machinists. Made of heat treated alloy steel rust-proofed.

There is a WESPO Clamp Assembly to suit every job—15 types—100 sizes. Also over 350 standard fixture parts and fittings.

Standardize on WESPO Fixture Clamps and Fittings. Save designing time—save tool room time. Full scale Template drawings of fixture clamps and parts are sent on request—Write for catalog.

Model 4 Clamp

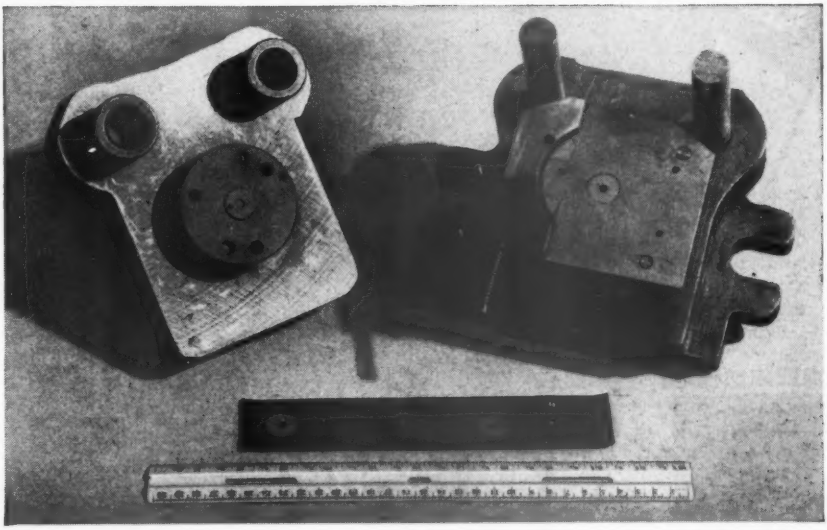


WEST POINT MFG CO.

26935 W. 7 MILE ROAD, DETROIT 19, MICHIGAN

OVER 350 FIXTURE PARTS WRITE FOR CATALOG

Graph-Mo® steel dies produce up to 80,000 parts without throwing burrs!



THE Reliable Tool and Die Company, Cleveland, Ohio, was having trouble with the chromium and carbon dies it used in making small, intricate gears and parts for electric motors and toy mechanical winding motors.

The dies were throwing burrs. The parts often tore when broached. Gear teeth spalled in the dies. And die life was short due to chipping of the cutting edges.

Then Reliable's engineers tried Graph-Mo®, one of four Timken® graphitic tool steels. The Graph-Mo blanking dies produced as many as 80,000 parts without a single burr. Because of free graphite in its structure, Graph-Mo has outstanding low-friction properties: minimum tendency to scuff, seize, score or gall. Tearing and spalling were eliminated. And the cutting edges stayed sharp and true because the diamond-hard carbides in Graph-Mo give excellent resistance to wear and abrasion.

Graph-Mo also offers other advantages. It responds uniformly to heat treatment, permitting close tolerances in the parts. It has good stability, and is easier to machine than ordinary tool steels.

For information on the four Timken graphitic tool steels and their use in punches, dies, gages and machine parts, get the new 10th edition of "Timken Graphitic Steel Data Book". Write on your business letterhead to The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

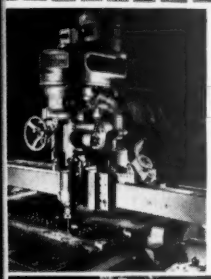
TIMKEN
Fine Alloy
STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

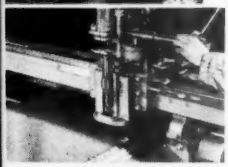
ANNOUNCING

WALES drilling machine with new boring head



BORING

Close-up of boring operation on Wales Deluxe Model Drilling Machine.



DRILLING & REAMING

Showing a hole in the work being reamed by simply interchanging the drill and bushing with corresponding size reamer and reamer bushing.

SCAN-A-SCALES

Showing the 2 built-in "Scan-A-Scales" that accurately locate drill head and slide rail for "zeroing in". Air locking clamps hold the work rigid during drilling operations.

WALES new Deluxe Model Drilling Machine has been developed for more versatile operations including BORING, DRILLING, REAMING and CLOSE TOLERANCE LOCATING. *There is no other boring and drilling machine or jig borer like it.* Precision, speed and ease of operation are built right into this machine.

Accuracy is the primary consideration in manufacturing this exclusive Wales Drilling Machine that handles material of practically any length and up to 36″ wide.

A pair of built-in "Scan-A-Scales" calibrated in ten thousandths of an inch accurately locate head and slide rail after rough positioning by rapid traverse.

This is too BIG a story to tell here so write TODAY for fully-illustrated, functionally-colored Catalog DM.

WALES-STRIPPIT CORPORATION

GEORGE F. WALES, *Chairman*

355 **PAYNE AVE., NORTH TONAWANDA, N. Y.**

(*Between Buffalo and Niagara Falls*)

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

The Solution To Your Die and Mold Cleaning Problems

-LIQUAMATTE
WET BLASTING

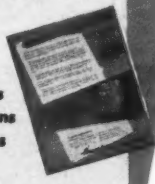
Typical heat treated forging die, one half of which has been cleaned with the Liquamatte using a fine mesh Liquabrasive.

Fourteen exclusive, advanced design features incorporated in the Liquamatte method of close tolerance finishing assure better, less costly cleaning in the manufacture and maintenance of tools, dies and molds. Its simplified design overcomes the many operating difficulties often found in wet blasting.

With the Liquamatte, "hand" finishes are produced mechanically in a matter of seconds, eliminating many tedious operations. Precision parts can be processed while holding tolerances of .0001". Scale and directional grinding lines are uniformly removed greatly prolonging the life of expensive tools and dies. "Break-in" time of new dies is reduced to a minimum.

Cutaway view of the Liquamatte, equipped with traveling work car permitting cleaning of heavy molds and dies.

GET THE FACTS
Clip coupon for Bulletin 23



Contains
Advantages
Specifications
Applications

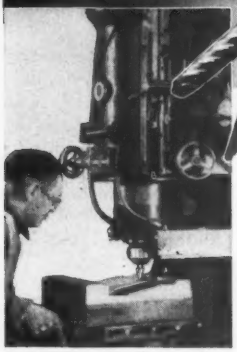
American LIQUAMATTE WET BLASTING
WHEELABRATOR & EQUIPMENT CORP.
852 S. Byrkit St., Mishawaka, Ind.

Please send me Bulletin 23.

Name_____ Title_____
Firm_____
Address_____
City_____ Zone_____ State_____

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

LARGEST SELLING CUTTERS FOR TOUGH DIE STEELS!



This T-J Cutter at work on a connecting-rod die block for a board drop hammer. A cutter of right design and heat treatment for this high speed work in tough die steels, making possible maximum efficiency of these machines.

Specify T-J

FOR MORE WORK BETWEEN GRINDS!

In die and forge shops everywhere . . . T-J Die Sinking Milling Cutters are today's top favorites . . . because they're "tops" in performance!

You can raise the feed . . . they're *extra sturdy* for cutting tough die steels! Designed for speed, accuracy and long life . . . T-J Cutters hold a sharp edge longer on job after job . . . less breakage! Made from an extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground. Wide range of styles and sizes . . . *right* to increase the output of your machines and *reduce costs!* Send for new catalog 150. The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

DIE SINKING MILLING CUTTERS

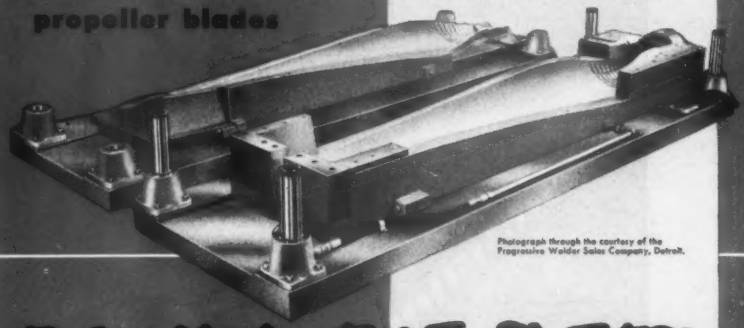
HOT FORMING

aircraft propeller blades

This unique new process takes a previously hot-worked billet and hot forms it into a one-piece hollow steel aircraft propeller. Now, in three steps requiring only a few minutes, a superior propeller is produced that formerly required hours of work.

The development gave rise to the problem of building a special 15 ton die that would provide a quenching action from 1450 degrees in a five minute press cycle.

For a die like this, the diemakers called for . . .



Photograph through the courtesy of the Progressive Welder Sales Company, Detroit.

DANLY DIE SETS

Reliable Danly precision plus unmatched facilities for the production of standard or special die sets like the one shown here make Danly Die Sets the first choice of diemakers everywhere. A nation-wide system of branch assembly plants* assures prompt, time saving service.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

CALL ON YOUR
NEAREST DANLY BRANCH
for fast, local delivery!

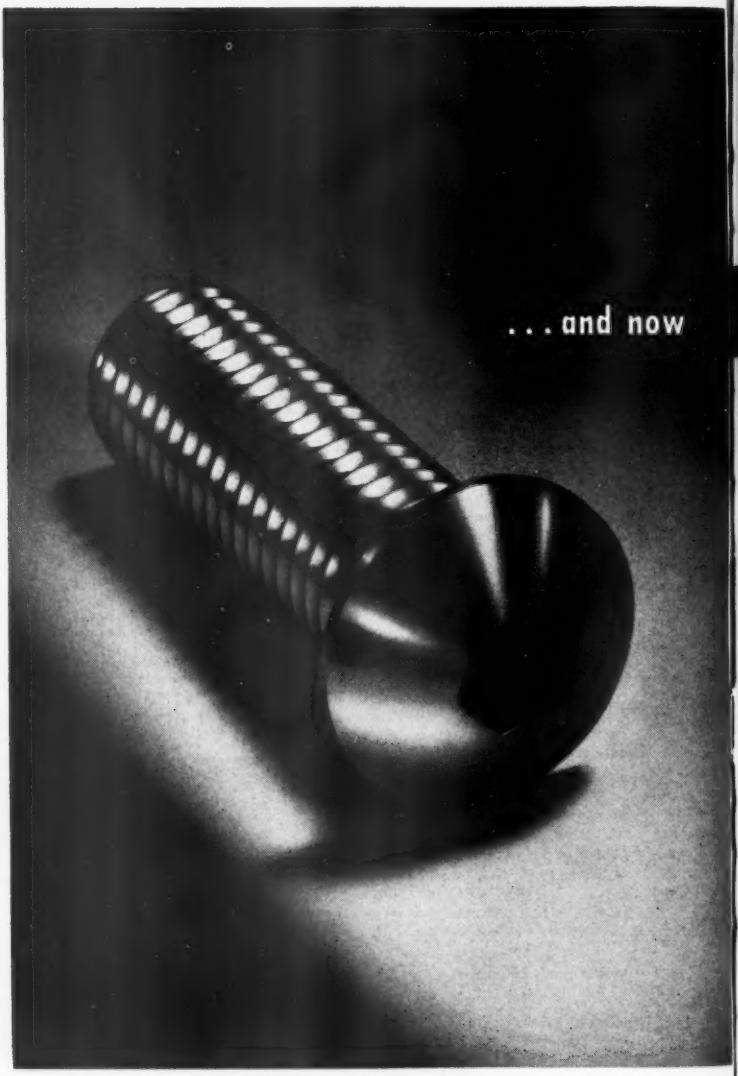
*CHICAGO 50, 2100 South Laramie Avenue
*CLEVELAND 14, 1550 East 33rd Street
*DAYTON 7, 3196 Delphos Avenue
*DETROIT 16, 1549 Temple Avenue
*GRAND RAPIDS, 113 Michigan Street N.W.
INDIANAPOLIS 4, 5 West 10th Street
*LONG ISLAND CITY 1, 47-28 37th Street
*LOS ANGELES 54, Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2, 111 East Wisconsin Avenue
PHILADELPHIA 44, 18 West Chelten Avenue
*ROCHESTER 4, 16 Commercial St.

*Indicates complete stock

DANLY

PRECISION DIE SETS -/- STANDARD AND SPECIAL

MORE THAN 25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY



FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

UNBRAKO BUTTON HEAD SOCKET CAP SCREWS

These UNBRAKO screws are strong, accurate and uniform. They are designed for applications where countersinking is not practicable. They feature:

- **Head and threads concentric with the body**
- **Threads to head**
- **Low head height that streamlines design**
- **Nonslip drive that speeds assembly**
- **Nonburr socket that eliminates injuries from sharp splinters**
- **Class 3 fit—an UNBRAKO standard**
- **Stocks at your UNBRAKO industrial distributor**
- **Standard sizes—#8 through ⅝" diameter.**

Write for literature. STANDARD PRESSED STEEL CO., Jenkintown 36, Pennsylvania.

UNBRAKO® SOCKET SCREW DIVISION

SPS
JENKINTOWN PENNSYLVANIA

EXAMINE *It Closely*

THERE IS A DIFFERENCE

Model J, 10" x 18" capacity. Available as a wet or dry cutting machine.

JOHNSON METAL CUT-OFF BAND-SAWS

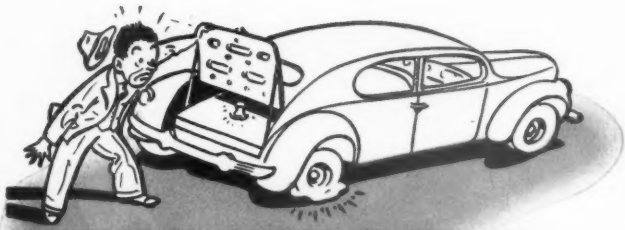
Have Outstanding Features

If you are thinking about new metal-cutting equipment, it will pay you to investigate the outstanding features of the Johnson Metal-Cutting Saws. Their exclusive design, ample capacity and ruggedness speak for themselves. These efficient low-cost machines offer the highest value available today.

Write for Details Today

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD



WOULD YOU DRIVE WITHOUT A *Spare?*

"Just my luck! A flat tire and no spare! What a predicament!"

A machine shop foreman may be in a worse predicament without a spare arbor. When an arbor breaks, production ceases until the arbor is replaced. Machine and manpower hours wasted! Schedules disrupted! Deliveries delayed! That's why we say —

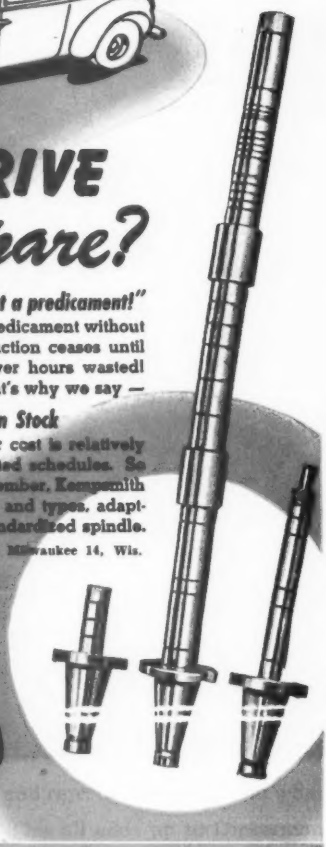
It Pays to Have Several Arbors in Stock

Arbors are "perishable tools" and today their cost is relatively small in comparison to lost hours and disrupted schedules. So play safe! Order your spare arbors today. Remember, Kempsmith Arbors are now available in all popular sizes and types, adaptable to any make of milling machine with standardized spindle.

THE KEMPSMITH MACHINE CO., 1829 S. 71st St., Milwaukee 14, Wis.

Get Your Copy of this NEW ARBOR BULLETIN

Describes the complete Kempsmith line of Arbors and Accessories. Also gives you helpful information on how to keep your arbors in condition. Fill in and mail coupon — today. No obligation.



Arbors BY

KEMPSMITH

• Precision Built Milling Machines Since 1888 •

Contact Your Local KEMPSMITH Dealer When in Need of Milling Machines, Attachments, Arbors and Accessories

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Measure with Confidence with Tumico

There was a time when "hair-line" accuracy was industry's critical standard of measurement. Today, Tumico instruments divide and redivide that mythical "hair-line" many times.

Tumico precision measuring tools are being used by a large segment of American industry. We cordially invite your inquiries on how to solve standard and special production measuring problems.

TUBULAR FEATHER TOUCH **MICROMETER CO.**

ST. JAMES, MINNESOTA

Lower unit costs are yours with Dickerman. Assuring longer die life and fewer regrinds, Rol-di-Feed operates accurately and automatically – greatly reducing the number of blanks and rejects encountered in what is now your standard production set-up. This all adds up to Dickerman Die Feeds doing work equivalent to five workmen.

Write for detailed information today

H. E. DICKERMAN MFG. COMPANY Dept. H 323 Albany Street • Springfield, Mass.

Export Address — STATES TRADING, 401 Broadway, New York 13, N. Y.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Nichols
TOOL ROOM MILLER

Accurate
Sensitive
Versatile

A compact, rugged miller that gives the tool room what it **demands**—extreme accuracy and utmost flexibility. The NICHOLS TOOL ROOM MILLER is arranged for sensitive hand screw feed. It has generous table surface of 8½" x 30", with 19" longitudinal travel. Precision feed screws are fitted with oversize, easy-reading micrometer dials. Large hand wheels provide the element of "feel" so important in precision milling. Rise-and-fall spindle enables easy handling of many difficult operations—increases usefulness—simplifies set-ups. Readily available are dividing head, vertical attachments, vises, and a full line of milling accessories. Priced surprisingly low. Literature on request.

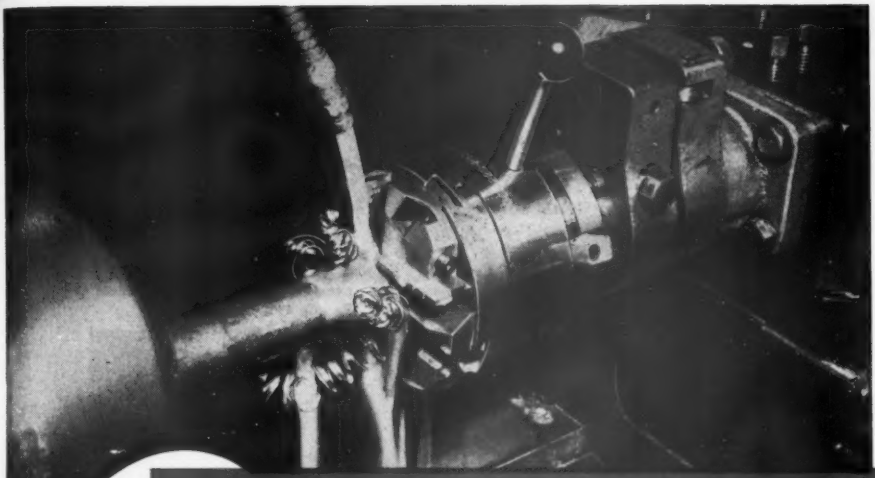
MANUFACTURED BY W. H. NICHOLS COMPANY, WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS

NICHOLS-MORRIS CORPORATION

76-X Mamaroneck Avenue, White Plains, New York

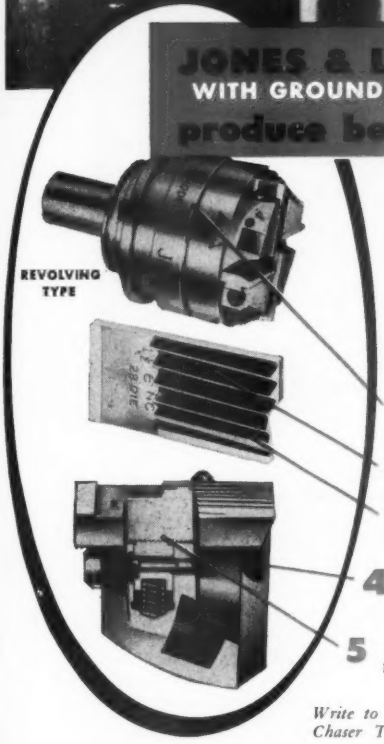
FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD



JONES & LAMSON DIE HEADS

WITH GROUND THREAD TANGENT CHASERS

produce better threads at lower cost!



J&L Tangent Chaser Die Heads are rugged, dependable, time-tested tools. They are production engineered to produce better threads at speeds limited only by the material being threaded. Capacities are from #4 to 2".

There is a J&L Tangent Chaser Die Head engineered for your requirement. Stationary types are available for turret lathes or any machine where the tool does not turn. Revolving types are for automatic screw machines, drill presses, threading machines, or any machine where the tool is held in a live spindle.

Among the many features contributing to their ability to perform your threading job faster and better are these:

1. They are hardened and ground throughout. The chaser holding blocks are precision lapped for perfect fit into the dovetail slots in the body. Chaser cutting edges are held to a minimum distance from the die body.
2. Chasers are guaranteed to produce threads to Class #3 fit or better.
3. Exact helix angle is ground into the chasers after hardening. The result is a freer cutting tool—operating with a minimum of friction, heat and wear.
4. With a single set of chaser holders any standard thread within the rated capacity of the holders can be cut, regardless of helix angle. This eliminates the expense and trouble of constantly changing holders for different helix angles.
5. Chasers are changed and set quickly and easily, giving you more production hours each day.

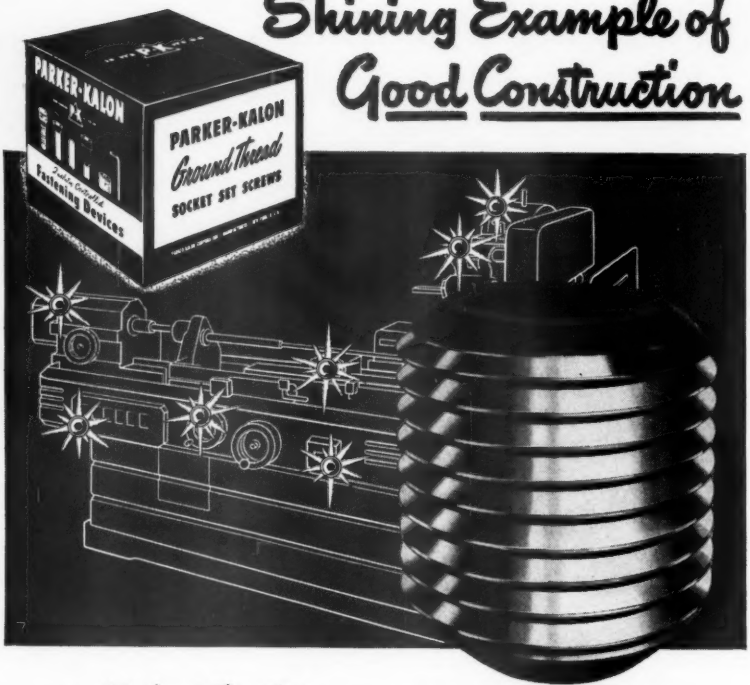
Write to Department 710 for catalog on these and Radial Chaser Types and Dies for Brown & Sharpe machines.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. J&L DIE HEAD DIVISION

Shining Example of Good Construction



good judgment calls for
PARKER-KALON®
when good design calls for
SOCKET SCREWS

DELIVERIES ARE BETTER
CHECK WITH P-K FIRST

Your **P-K DISTRIBUTOR** *has good news. His stocks of P-K Screws are steadily improving. The size and type you need may now be readily available. Ask about it. Remember—"If it's P-K . . . it's O.K."*

Whether you make simple jigs and fixtures or giant machine tools, assembly with P-K Ground Thread Socket Set Screws will reflect superior construction throughout. Any buyer associates topmost quality with their super-smooth, gleaming *ground thread* finish.

This sales-feature is only one advantage. Assembly moves faster, too. Workers like their clean, burr-free contour, their easy keying, their dependable Class 3 Tolerance.

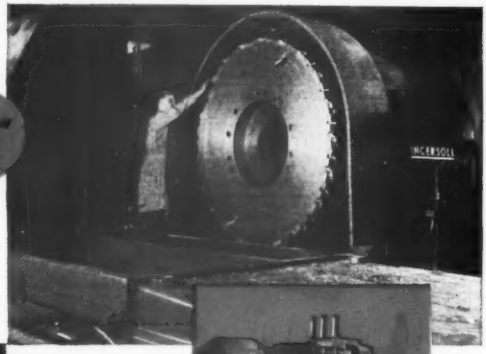
Ask for samples. See why P-K Ground Thread Socket Set Screws will put your product out in front, assembly-wise and sales-wise. Parker-Kalon Corporation, 200 Varick St., New York 14.

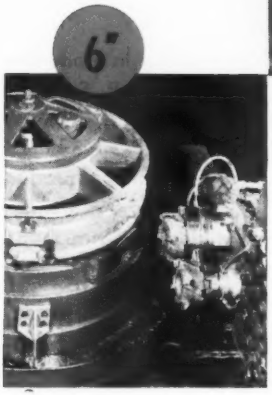
SIZE-MARKED CAP SCREWS • GROUND THREAD SET SCREWS • FLAT HEAD CAP SCREWS • STRIPPER BOLTS • PIPE PLUGS • HEX KEYS

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

INGERSOLL

SHEAR CLEAR CUTTERS ON MAGNESIUM





Feeds 140" per minute
Stock up to 1/2"

Here are two examples of Ingersoll Shear Clear face mills with carbide-tipped inserted blades, used on special design machines recently built by Ingersoll for work on magnesium.

The 74"-diameter cutter, driven by a 500 h.p. motor, scalps magnesium ingots.

The two 6" face mills, driven by a 15 h.p. motor, machine pads on jet engine compressor frames.

Shear Clear cutters are especially suited for machining magnesium when fine finishes are required. The patented design of the Shear Clear causes the chip to coil evenly out along the blade away from the finished surface so that the surface is not scored by chips packing in the cutter faces.

Shear Clears for steel, copper, aluminum, and magnesium, as well as for high-feed milling of cast iron, are described in Ingersoll Catalog 56, which will be sent on request.

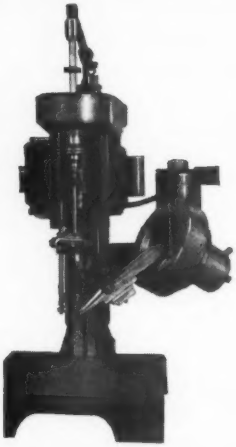
THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILL.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

What's Wrong With This Picture?

THAT'S EASY

THERE'S NO DETROIT POWER SCREWDRIVER



● Now—more than ever—speed in production is the order of the day—and D. P. S. Power Screwdrivers provide a wonderful contribution to present-day industrial needs . . . They are a "must" wherever the program calls for production assembling . . . They afford a tremendous gain over obsolete, slow hand methods. Detroit Power Screwdrivers will drive screws—any kind of screws—as fast as one as econd.

● Get our Catalog NOW, describing POWER SCREWDRIVERS, MOTORIZED HOPPER UNITS, NUT DRIVERS and SPECIAL ASSEMBLING MACHINES. Write today. Also send sample assembly for production estimate.

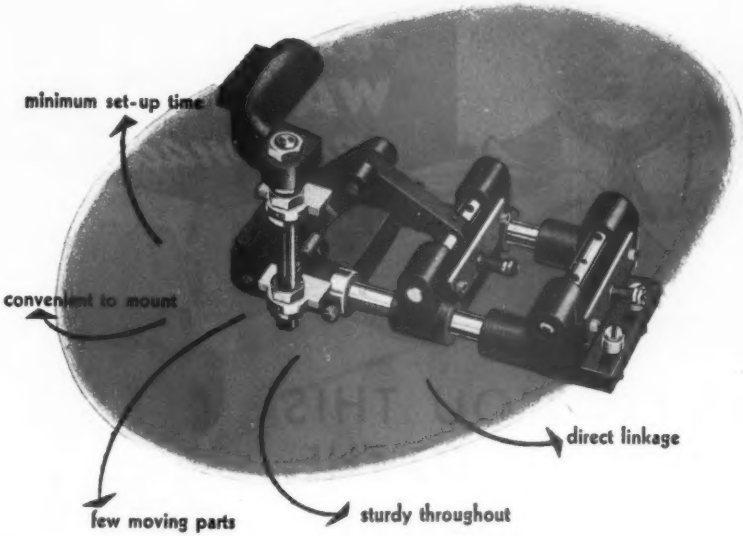
DETROIT POWER SCREWDRIVER CO.

2827 W. FORT ST. DETROIT 16, MICH.

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

New automatic *Surefeed*

improves press performance



Here is an entirely new approach to automatic feeding . . . mounting made easy, set-up time cut, and long continuous operation maintained.

Producto Surefeed is quickly and easily mounted on the die set . . . both can be handled as a single unit. Set-up and adjustment have been made very simple. Parts are few and designed for strength . . . no actuating springs, cams or other intricate parts to cause trouble. A high degree of accuracy is obtained through direct linkage and positive feeding action. Cost of Surefeed, as a result of practical designing, is very low.

Write today for Surefeed Bulletin. Read how you can save money and improve your pressroom schedules.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Ave., Bridgeport 1, Connecticut

For Better Feeding . . . Call . . . PRODUCTO

ALSO MAKERS OF TOOL AND DIEMAKERS ACCESSORIES, VISES, MACHINERY

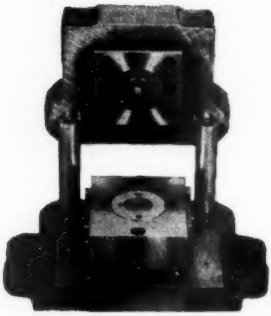
SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

A MUST wherever WASHERS are made!

HOVIS

OFFERS YOU THIS SIMPLE, UP-TO-THE-MINUTE METHOD

There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.



Made in 5 sizes:

¾"—1½"—2½"—4"—6"

Write for literature.

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD
Phone: Slocum 7-4800

VAN DYKE, MICHIGAN
Suburb of Detroit

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

Never Before!!

. . . SO MUCH POWER PER POUND

MEET the new Rotor Vertical Air Grinders! Never before have you had so much power in vertical air grinders . . . for such light weight! They're well balanced . . . easy on the operator. Here are *new* features to speed up your metal removal.

AIR O'TOOL

THE NEW B-35

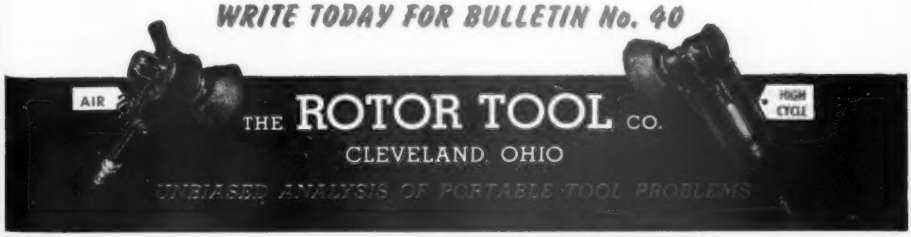
Weight	10¾ lbs.
Height	7½ inches
Spindle	⅜"—11"
6000-5500-4500-3500 RPM	

THE NEW B-12

Weight	10 lbs.
Height	7 inches
Spindle	⅜"-11"
6000-5500-4500-3500 RPM	

For cup wheels, sanding pads, cut-off wheels, wire brushing.

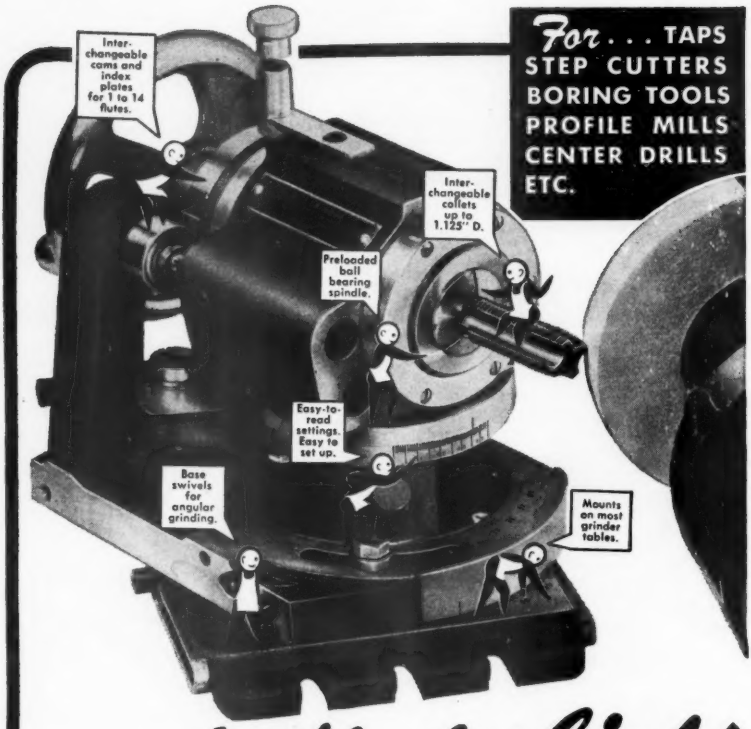
WRITE TODAY FOR BULLETIN No. 40



THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS


Inter-changeable cams and index plates for 1 to 14 flutes.
Inter-changeable collets up to 1.125" D.
Preloaded ball bearing spindle.
Easy-to-read settings. Easy to set up.
Base swivels for angular grinding.
Mounts on most grinder tables.

For . . . TAPS
STEP CUTTERS
BORING TOOLS
PROFILE MILLS
CENTER DRILLS
ETC.

What a relief!

More Cuts Per Grind
Better — Freer Cutting

Reduce perishable tool costs with this preferred grind on your straight and spiral flute production cutters — Easy and fast as ordinary angular relief grinding.

D•S GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
621 E. Fourth St., Royal Oak, Mich.

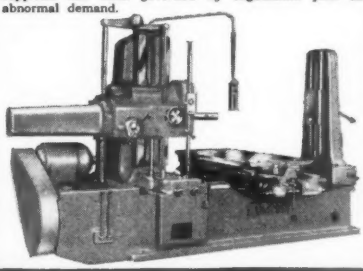
D•S RADIAL RELIEF GRINDER

Only Lucas CAN MAKE A LUCAS

but other[illegible]

This is one of America's outstanding plants of its kind, and every tool in it is there for the production of Lucas Horizontal Boring, Drilling and Milling machines. This specialization means a greater output of critically needed machines for the defense program.

We still have to keep many a loyal customer waiting, because our output like that of all other defense machine suppliers has been governed by regulations plus an abnormal demand.



Your inquiry and your order are still as welcome as ever. When you do get the Lucas you need you'll find it your No. 1 money maker – the most used machine in the shop.

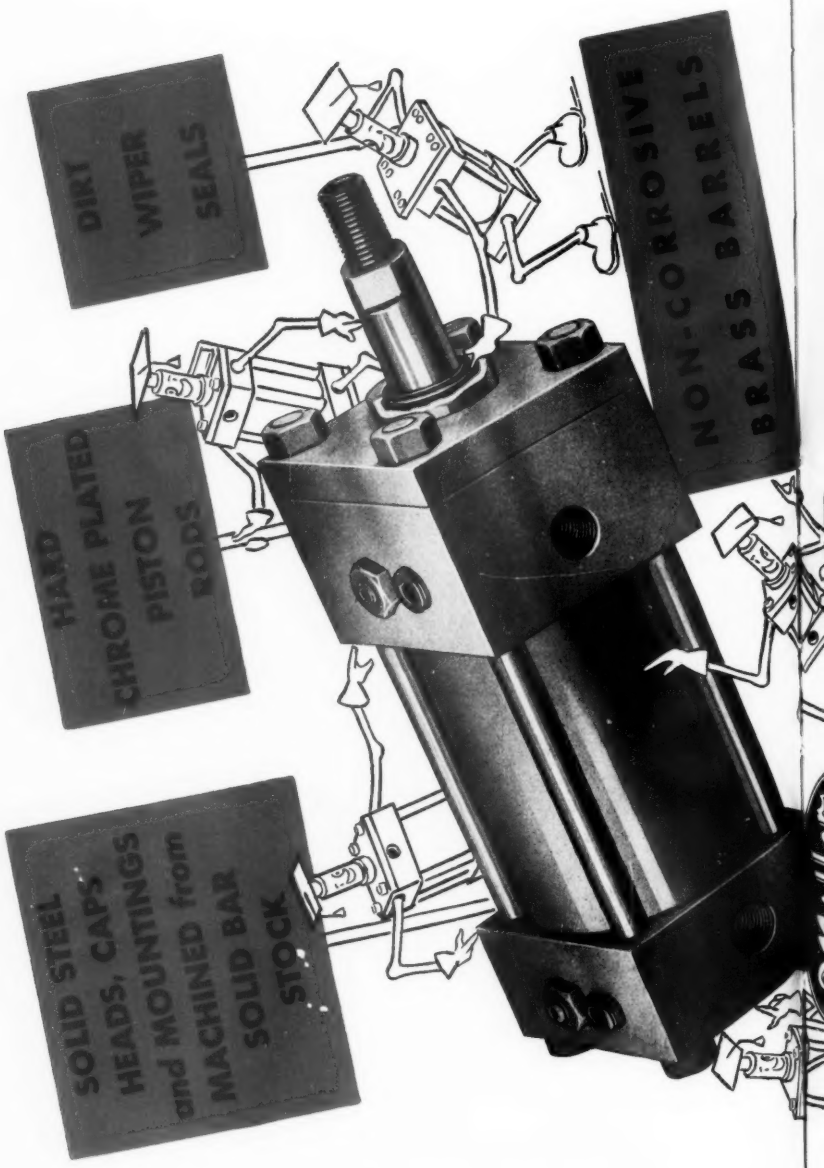
THE NEW BRITAIN MACHINE COMPANY LUCAS CLEVELAND

LUCAS

Precision

HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS


DIRT WIPER SEALS
HARD CHROME PLATED PISTON RODS
SOLID STEEL HEADS, CAPS and MOUNTINGS from MACHINED SOLID BAR STOCK
NON-CORROSIVE BRASS BARRELS

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

AIR CYLINDERS

FOUR-WEEK DELIVERY

To Meet Your

RUSH

Cylinder Requirements

. . . now assured by our modern new plant with greatly expanded facilities — devoted exclusively to the manufacture of quality cylinders.

Write for illustrated cylinder Bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

Miller

MILLER MOTOR COMPANY

2046 N. HAWTHORNE AVE., MELROSE PARK, ILL.

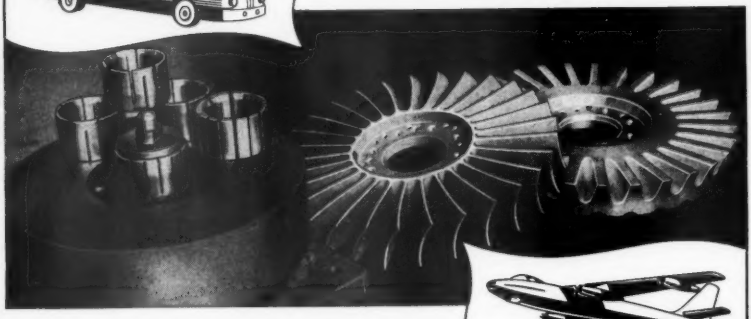
AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · AIR HOISTS

Sales and Service from coast to coast

CLEVELAND — YOUNGSTOWN — DAYTON — PITTSBURGH — PHILADELPHIA
BOSTON — HARTFORD — NEW YORK CITY — BUFFALO — ST. PAUL
DETROIT — GRAND RAPIDS — FLINT — FORT WAYNE — INDIANAPOLIS
MILWAUKEE — LOUISVILLE — KANSAS CITY — SEATTLE — LOS ANGELES
SAN FRANCISCO — BALTIMORE — ST. LOUIS — HOUSTON — TORONTO
and OTHER AREAS.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

from BUSES



to BOMBERS...

Wherever quality and precision of parts must meet exacting performance tests, you will find ERICKSON Precision Holding Tools an integral part of the machining set-up. ERICKSON engineers can help you obtain the highest degree of accuracy at production rates you never dreamed possible.

A typical example in the use of ERICKSON expanding mandrels is illustrated above. The photograph shows a loading stand utilizing Erickson mandrels for maintaining precision concentricity on inducers and impellers. Each Erickson mandrel accommodates a wide range of sleeves and each sleeve expands over a range of 1/32". Thus, one mandrel is able to handle a great variety of work.

Only ERICKSON Mandrels grip along their entire length, give positive grip and self release.

THINK OF THESE ERICKSON TOOLS IN TERMS OF YOUR PRODUCTION PROBLEMS:

- **COLLET CHUCKS — prolong tool life, permit stubbing. GUARANTEED Accuracy of .0005" T.I.R. One Erickson Collet replaces 7 single purpose collets.**
- **FLOATING HOLDERS — correct both angular and parallel misalignment.**
- **AIR CHUCKS — compact, fast acting, tremendous gripping power.**
- **EXPANDING MANDRELS — Erickson principles applied to I.D. Holding.**
- **SPEED INDEXERS — operate by air or hydraulics, vertically or horizontally.**

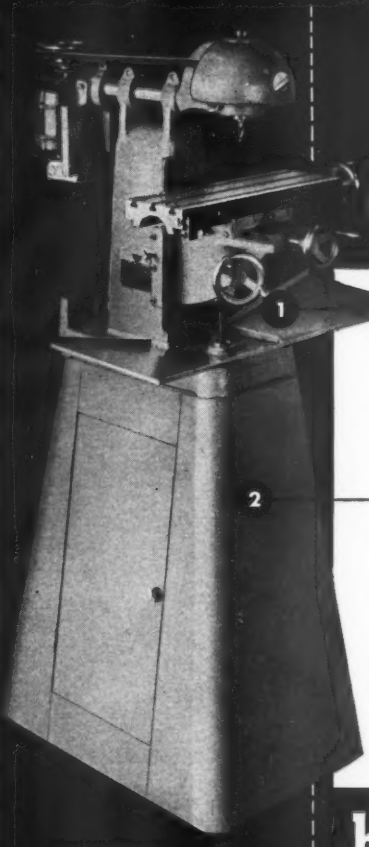
Write for Catalog "J" Today

ERICKSON TOOLS

DIVISION OF THE ERICKSON STEEL COMPANY

2314 K HAMILTON AVE. • CLEVELAND 14, OHIO

2 New Benchmaster Mill Accessories that DOUBLE CONVENIENCE!



SPLASH TRAY

CAPTURES COOLANT RUN-OFF

Confines coolant to the table working area, draining surplus back to sump. Sheet steel edges rolled and beaded for extra strength. Size extends beyond all table movements. Easily attached by flanges provided.

PEDESTAL BASE

CONVERTS BENCH MILL TO FLOOR MILL

This new Benchmaster accessory furnishes a solid, secure mounting for your Benchmaster. Order it as a standard extra with new Benchmasters—or independently to convert present bench installations! Measures 30" high. Base dimensions 18" x 26". Top dimensions 10½" x 18". Rolled sheet steel construction; internal area accommodates our M-21 coolant system or can be used for storage.

Order today from your dealer or write for information!

benchmaster
MANUFACTURING COMPANY
1835 W. ROSECRANS AVENUE, GARDENA, CALIFORNIA

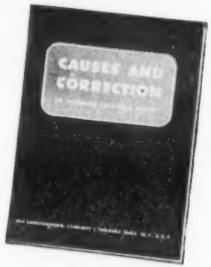
General Purpose Wheels . . .

General Purpose Wheels by CARBORUNDUM give you the widest possible range of abrasive tool versatility. Furnished in standard sizes for every known make of grinding machine, they improve the quality and quantity of work, from veteran and inexperienced operators alike. In the cool cutting, long lasting V30 bond developed especially for general purpose work, "ALOXITE" aluminum oxide wheels are outstanding performers. They give you the ideal combination of abrasive grain, bond, grade and structure which provide highest grinding performance

DISTRIBUTOR TODAY. He's your best bet for complete stocks, prompt delivery,

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

bond, grade and structure which provide highest grinding performance at least cost. See your CARBORUNDUM **DISTRIBUTOR TODAY.** He's your best bet for complete stocks, prompt delivery, experienced counsel on latest developments in the field. You'll find him listed in the yellow pages under "Abrasives." Phone him today—it's to your profit!



This "tell-all" booklet is FREE!

THE CARBORUNDUM COMPANY, Dept. TP 81-81
Niagara Falls, New York
Please send me, FREE, your booklet, "Causes and Correction of Common Grinding Errors."

NAME AND TITLE COMPANY

STREET AND NUMBER CITY ZONE STATE

Only CARBORUNDUM TRADE MARK

offers ALL abrasive products . . . to give you the proper ONE

"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

81-81A

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

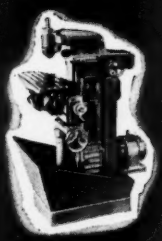
DECKEL

SYNONYMOUS WITH QUALITY

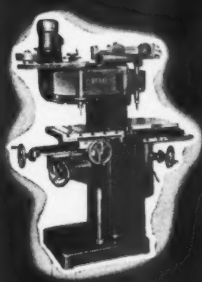
DECKEL MACHINE TOOLS universally recognized for Quality, Precise Production and Versatility. They can be used as single purpose machines for production or for multi-purpose operations in tool rooms and specialty plants.

Investigate all the advantages of DECKEL Universal Machines — Quality Tools at Lower Costs. In Stock For Immediate Delivery.

FP 1 — UNIVERSAL MILLER (Horizontal and Vertical) for single jobs or production of tools, jigs, gauges, dies and molds. Micrometer measuring devices for jig boring. Attachments: Punch Milling, Spiral Milling, Vertical Milling Heads, Slotting Device, Fixed, Swivel or Circular Tables, Dividing Head.

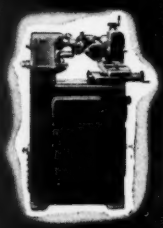


GK — 3 DIMENSIONAL ENGRAVER & COPY MILLER (2 Sizes) for fine engraving, embossing and copy milling dies, molds, etc. up to 550 lbs. Reduction or enlargements from 1:1.5 to 1:10. Pre-loaded bearings in pantograph provide easy guidance, playless motion, minimize vibration. Larger machine has rough milling attachment.

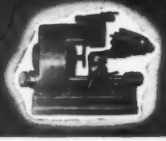


KF 1 — UNIVERSAL COPY MILLER for producing dies and molds up to 1100 lbs. With special accessories, the KF 1 provides greatest manufacturing economy. One handed 3 dimensional control. Ratio 1:1. Reduction and enlargement attachment has ratio from 1:1.5 to 1:7. Copy Table — 15" sq. Max. work piece height 17". Optical tracing mechanism. Circular milling attachment.

G 1 U — 2 DIMENSIONAL ENGRAVER for fine engraving and light milling. Ratios from 1:1 to 1:50. Light Pantograph with playless ball bearing joints provides easy guidance and accurate work.



S 1 — UNIVERSAL TOOL & CUTTER GRINDER for grinding spiral or straight fluted cutters, counterbores, countersinks, straight and taper reamers, taps, etc. Production grinding of high precision tools. Easy, convenient operation with utmost accuracy.



TYPE SON — SINGLE LIP CUTTER GRINDER indispensable for grinding and backing off form cutters and tracing styluses used on the G 1 U, GK 12, GK 21, KF 1, FP 1. Can be operated quickly and accurately by unskilled workers.

SEE THESE MACHINES IN OPERATION AT COSA'S NEW YORK SHOW ROOM OR SEND FOR DESCRIPTIVE LITERATURE.

COSA CORPORATION
405 Lexington Ave., New York 17

Your source for all Precision Machine Tools— from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

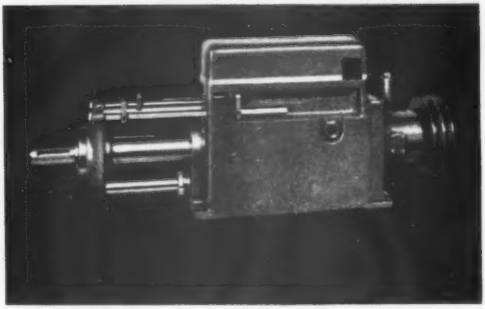
Announcing

THE DYNAMIC

DRILLUNIT* FROM DYNAMIC DETROIT

SPECIAL FEATURES:

Push button control.
Mount in any position.
Supplied with 9" or 12" stroke.
Traverse rate over 400" per min.
Feed rate up to 30" per min.
Capacity ½" in steel.
Two-bolt sheave.



Here is the self-contained *Drillunit* — a compact unit that machine tool builders long have wanted. The introduction is opportunely timed to meet defense production for 1952.

DRILLUNIT, INC.
635 MT. ELLIOTT DETROIT 7, MICHIGAN

Manufacturers Representatives:
A few desirable territories are open to qualified representatives.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

42 SECONDS—FLAT!
. . . a new threading record
for the CRI-DAN "D"
Product: Diesel Engine Stud
Size: 2½" Diameter; 2½" Thread Length; 4-pitch thread
Material: 4150 S.A.E. Steel
30-32 Rockwell "C"

Here's another example where the fabulous Cri-Dan "D" threading machine licked a tough threading job in *seconds* that would have normally taken *minutes.*

This time the part was a Diesel Engine Stud, 2½" in diameter in which a 4-pitch thread 2½" long had to be cut in 4150 S.A.E. Steel.

The well-known company* doing the job reports phenominal results in accuracy as well as speed using the Cri-Dan "D" with a single carbide tipped tool.

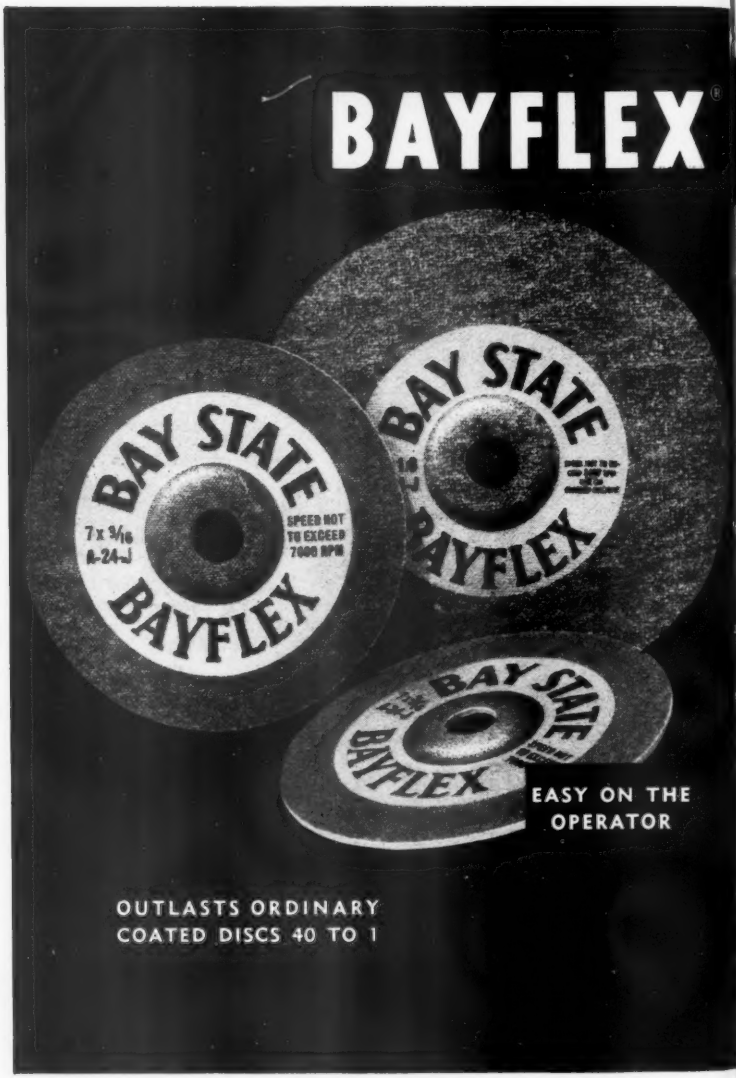
Whether you have an unusually tough threading problem where accuracy is at a premium, or a threading operation you'd like to speed up, by all means check with your Lees-Bradner representative and get the facts on the Cri-Dan "D".

*Name on Request

the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

WORK MOVES FASTER
COSTS LESS with a Fray
No. 10-R UNIVERSAL RAM • TURRET TYPE • VERTICAL
MILLING MACHINE
You get a wider work range than with any other machine this size. You can machine at *any* angle—vertical, horizontal or both. You can mill, drill or bore at *any* angle. Hence resetting isn't necessary. Just change the machine—changing is quick. (For vertical and regular horizontal milling, use the 10-RH.) Jobs are done faster and better . . . at less cost. • It's Universal • Rugged • Easy to Operate.
A high precision tool.
Write for details and specifications.
Bulletin 10.
FRAY "ALL-ANGLE" HEAD TYPE 4
For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.
FRAY
All-Angle
FRAY MACHINE TOOL CO.


BAYFLEX®
BAY STATE
7 x 3/16
A-24-J
SPEED NOT TO EXCEED 7000 RPM
BAYFLEX
BAY STATE
BAYFLEX
BAY STATE
BAYFLEX
EASY ON THE OPERATOR
OUTLASTS ORDINARY COATED DISCS 40 TO 1

THE *Versatile* DISC-WHEEL

CUTS, SNAGS — Welds and surfaces to be welded on angle iron, pipe or other structural materials.

BLENDS, FINISHES — Surface irregularities such as fins, flashings, pattern marks and other deburring jobs on practically any ferrous or non-ferrous material.

CLEANS, SMOOTHS — Steel plate, removing mill scale and smoothing down rough, flame-cut edges.

ROUGH and FINISH *with the same wheel!*

Everyone likes Bayflex! The operators because of its light weight, resilient cutting action, ease of use and safety factor . . . the management because it's economical to buy and use and is readily adaptable to so many jobs. Try the Bayflex way; the easy, modern way to accomplish your portable grinding jobs.

ask for a demonstration on your work

BAY STATE ABRASIVE PRODUCTS CO.
Westboro, Massachusetts, U.S.A.

BAY STATE

Branch Offices and Warehouses —
Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

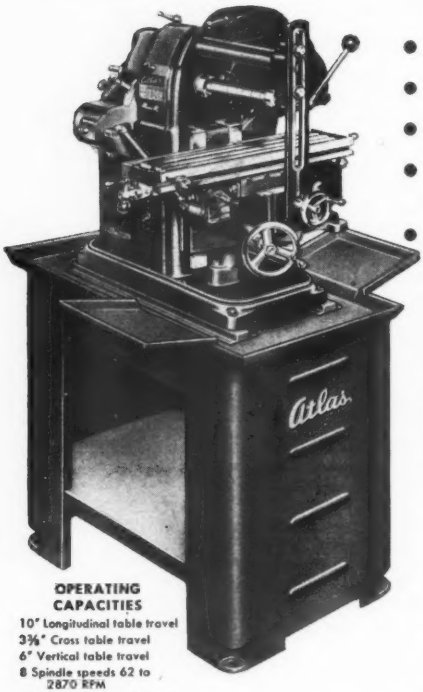
SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

MORE EFFICIENT MILLING
OF SMALL PRECISION PARTS

TIMKEN BEARING EQUIPPED

Atlas

MILLING MACHINE



- Complete V-belt drive
- Handles full range of milling operations
- Timken bearing equipped
- Choice of manual, Production lever, or Change-O-Matic power feed
- Lowest cost miller on the market

OPERATING CAPACITIES
10" Longitudinal table travel
3⅜" Cross table travel
6" Vertical table travel
8 Spindle speeds 62 to 2870 RPM
.186" to 11.250" Feed range per minute

YOU PUT the milling of small precision parts on a maximum-efficiency basis with the Atlas. It performs the full range of milling — from slabbing and facing cuts to end milling, keyways, finishing, and layout work — with the same exacting precision and dependability of large expensive machines . . . *at lower cost.*

It saves many hours monthly on set-ups, saves on power and operating costs — frees bigger machines for jobs that only they can handle. Every feature of larger machines "built down to size" make this the outstanding low-cost miller. Your Atlas distributor will gladly supply full details, or write for complete catalog.

ATLAS PRESS COMPANY
818 N. PITCHER STREET, KALAMAZOO, MICHIGAN

Atlas DEPENDABLE QUALITY TOOLS SINCE 1911

Savings reported by users of LINCOLN PARK CARBIDE GAGES

LESS GAGE REPLACEMENT

LESS GAGE CHECKING

MORE PARTS PASSED

LISTEN TO THIS . . .

"a lone $38 carbide gage saves us $4,000.00 a year" —"we cut gage checking expenses $20,000.00 annually with carbide gages"—"our initial gage costs reduced $1,280.00 in nine months on a single part inspection"—

Unbelievable? Not at all; Lincoln Park customers prove these statements with actual records. Take a look at your gage applications and see what you might save by using carbide gages.

For further information on how to reduce inspection costs with carbide gages, send for booklet—"If steel gages were *Free*".

MANUFACTURERS OF:

CARBIDE, CHROME PLATED, AND STEEL GAGES—CARBIDE ROTARY FILES—ALSO FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION.

THE PLUS IN PRECISION

Lincoln Park INDUSTRIES, INC.

1719 FERRIS AVENUE, LINCOLN PARK 25, MICH.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

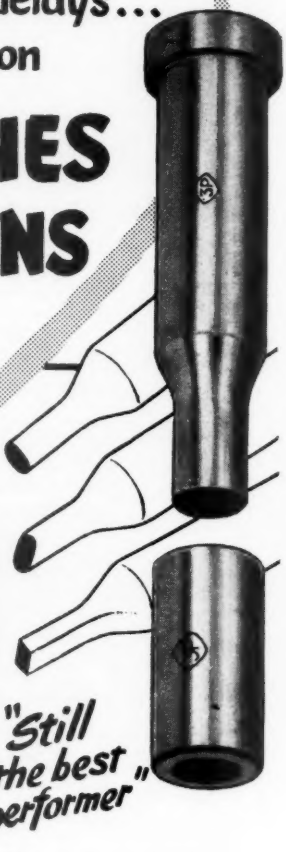
Avoid costly delays... Depend on 3P PUNCHES and DIE BUTTONS

Porter Precision Products

offer you

IMMEDIATE DELIVERY ON ALL STANDARDS

SPECIALS TO ORDER



3P products help prevent emergencies in your plant with dependable— cost-saving performance — plus — immediate delivery!

"Still the best performer"

PORTER PRECISION PRODUCTS

JAckson 9669 Cincinnati 31, Ohio

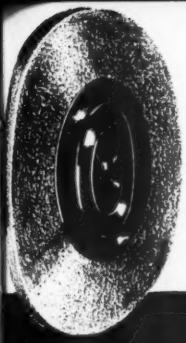
FOR PROMPT SERVICE . . . CALL

ATLANTA, GEORGIA	DE 4477	MADISON, CONN.	MAdison 479
CHICAGO, ILL.	ARlington 5-8314	MEMPHIS, TENN.	HEights 2905
*CINCINNATI, OHIO	KI 5432	*MILWAUKEE, WISC.	DIvision 4-3028
*CLEVELAND, OHIO	GLenville 1-3082	NASHVILLE, TENN.	2-7208
DALLAS, TEXAS	PR 1521	*PHILADELPHIA, PA.	MAyfair 4-7873
*DAYTON, OHIO	ENterprise 1596	ST. PAUL, MINN.	CEdar 1600
*DETROIT, MICH.	TRinity 1-3080	TORONTO, ONT.	HUdson 9487
*INDIANAPOLIS, IND.	PLaza 6319	*TULSA, OKLA.	3-6213
KANSAS CITY, MO.	DElmar 9600	*WICHITA, KANSAS	4-2379
*LOS ANGELES, CALIF.	TRinity 1539		

*Indicates complete stock.

SEND FOR COMPLETE CATALOG AND PRICES—TODAY!

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS



NEW

GRINDING CAPACITY AT BARTHS

30" GRINDING WHEEL

CAPACITY

10" DIAMETERS

48" LENGTHS

READY TO GO TO WORK

On your Big Grinding Jobs!

BARTH HAS STEPPED-UP ITS FACILITIES AGAIN with this large electronically governed grinder which provides the last word in repeat accurate sizing and fine finish on "out-size" grinding jobs. The big 30-inch wheel enables precision grinding on work up to 10" diameter and 48" long.

ELECTRONIC ALIGNMENT of the swivel table is achieved with the "Electralign" setting instrument . . . angular adjustments of the swivel table in relation to the sliding table are indicated on the dial of the amplifier in wide scale increments of .0001" . . . error in taper can be corrected in a single, positive adjustment.

WHETHER IT'S DIES, TOOLS, SPECIAL MACHINERY or production jobs. Barth makes available to you the very latest and most modern, up-to-the-minute equipment and facilities. Write for catalogue.

BARTH

STAMPING & MACHINE WORKS, Inc.

12650 Brookpark Road, Cleveland 29, Ohio

10" *Precision* TOOLROOM LATHE

Sound design, expert workmanship and quality materials give the 10" South Bend Lathe the dependable performance you want. Equipped with a precision lead screw, thread dial indicator and thread cutting stop, you can use it with confidence for cutting screw threads, making precision gauges or turning out instrument parts.

Another outstanding feature is the 1" collet capacity and 1-3/8" spindle bore which is built on the same design and specifications of larger lathes. The large spindle bore gives you big lathe collet capacity in a small, compact unit.

You will like the way this lathe cuts idle time . . . reduces costs . . . releases big lathes for heavy work. Write for catalog.

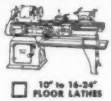
SPECIFICATIONS

SWING 10⅛" over bed and saddle wings, 5¾" over cross slide.
COLLET CAPACITY.....1 in.
SPINDLE BORE.....1⅜ in.
BED LENGTHS 3, 3½, 4, 4½ ft.
CENTER DISTANCES.....14¾ to 34¾ inches.
SPINDLE SPEEDS (12) 50 to 1357 r.p.m., approximately.
POWER LONGITUDINAL FEEDS 48 R.H. or L.H. . .0015" to .0836"
POWER CROSS-FEEDS 48 . . . .0006" to .0309"
THREAD CUTTING 48 R.H. or L.H. pitches, 4 to 224 per inch.

SEND INFORMATION CHECKED:

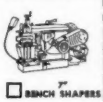
☐ _____
_____

☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES

☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES


☐ 7" BENCH SHAPERS

Name_____ Company_____
Street_____ City & State_____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

Automatic Recessing

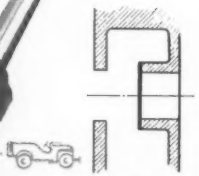
the "Know-How" of grooving

Wherever grooves, faces, chamfers, etc. are cut — whether internal or external— speed production, reduce costs on long runs

with SJ SCULLY-JONES

AUTOMATIC RECESSING TOOLS

They do these operations on standard drill presses, radial drills, turret lathes and chucking machines, as well as on special machines. A single recessing tool is easily adapted to do various operations or a combination Adjustments regulating location depth of groove are simple, fast and accurate. Types "J" and "C" pilot in a fixture bushing. Type "R" pilots in, and stops on the work.

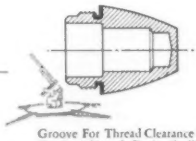


Facing An Internal Boss On Motor Castings Where Obstruction Usually Causes Difficulty.

Both Inside And Outside Clearance Grooves Cut In One Operation On Oil Tank Caps For Submarines.

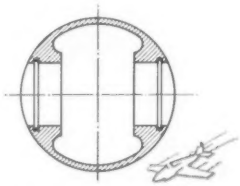
TYPICAL RECESSING-TOOL OPERATIONS

Formed Recesses Made In One Operation On Detonator Bushings Of Large Calibre Motorized Artillery Rifles.



Groove For Thread Clearance Cut On Anti-Aircraft Projectile With Automatic "Necking" Tool.

Casting Of Part For Army Tank On Which Two Recesses Are Made At One Time.



Snap-Ring Grooves Cut In Wrist Pin Hole Of Airplane Pistons.

Scully-Jones AND COMPANY

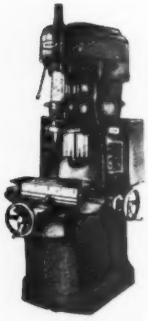
R-5496MT 1913 S. ROCKWELL ST., CHICAGO 8, ILLINOIS

WRITE FOR BULLETIN No. 10-52
showing types, sizes, specifications and prices.

YOU GET LOW COST, FAST, ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

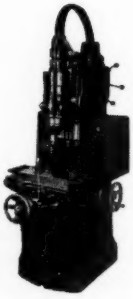
SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

NOW IS THE TIME TO PLAN AHEAD

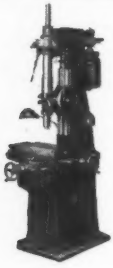


No. 2 MOORE JIG BORER, with its accurate lead screw settings within .0001", offers all the time-proven precision features associated with Moore Jig Borer construction for 15 years, plus numerous labor-saving advantages, including: increased capacity and size; infinitely variable spindle speeds; 3 power feed ratios; centralized controls.

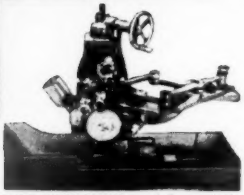
No. 2 MOORE JIG GRINDER. With this new and larger Moore Jig Grinder, *regular and irregular contours* are ground to size and location after hardening. This extends the Jig Grinder's traditional function of relocating straight and tapered holes. Holes from 1/64" to 8" can be relocated and ground within .0001"—by power or hand feed.



Four ways to cut costs and meet competition by mechanizing your toolroom.



No. 1 MOORE JIG BORER remains in the line. For its range—table working surface of 10" by 16" and cuts up to 3½"—this machine is still an ideal buy. There are over 1000 satisfied users. We will continue to offer it for the many situations where a small, accurate jig borer fills the required prescription.



MOORE PANTO-CRUSH WHEEL DRESSER speeds form-grinding and cuts costs. Both crush-forming and diamond-dressing are accomplished with this 2-in-1 unit permanently mounted on the wheel spindle of a surface grinder. You switch from one method to the other without disturbing workpiece setting.

We'll be glad to send you complete descriptive literature on any of these machines.

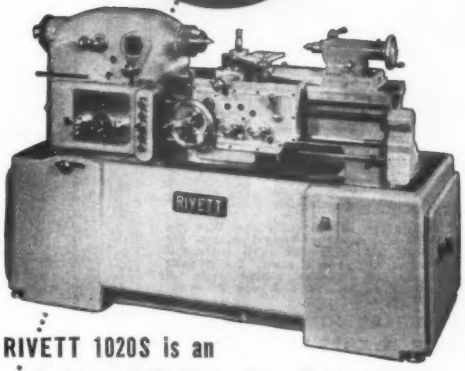
MOORE SPECIAL TOOL COMPANY, INC.
726 Union Ave., Bridgeport 7, Connecticut

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

2 FOR 1



RIVETT 1020S

HAS WHAT IT TAKES TO MAKE AN OUTSTANDING LATHE

★ 40% heavier than comparable lathes. Weighs 3900 lbs. ★Back gearing for power cuts—belt drive free of all gearing for high speeds. Range from 22 to 3600 R.P.M. ★ 12¾" wide hardened steel ways of bed absorb heavy cutting force. ★ Infinite spindle speeds through trouble-free mechanical drive. ★ Push button controls for complete operation. ★Neutral clutch stops spindle without stopping drive. ★ Three bearing mounts for spindle. ★ Collets mount directly in spindle. ★ Hand wheel for turning headstock spindle.

RIVETT 1020S is an Instrument Lathe and an Engine Lathe

A double-duty machine—combining the feather-touch sensitivity of an instrument lathe with that heavy-biting ruggedness which carbide cutting tools require—qualifies for any turning within its 12½" swing and 20" centers.

Write for Bulletin 1020A

RIVETT LATHE & GRINDER, Inc.

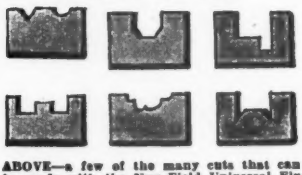
Dept. TP-8 Brighton 35, Boston, Massachusetts

You may turn other lathes . . . or employ other types of metalworking . . . but on no other . . . as on a Rivett.

NEW-FIELD

UNIVERSAL FLY CUTTER

Above: FACE MILLING



ABOVE—a few of the many cuts that can be made with the New-Field Universal Fly Cutter in ONE operation on a horizontal or vertical mill or drill press. Individually adjustable bit holders permit slots of any shape to be cut 3/16" to 2" wide.

STANDARD BITS MAKE 4 TO 6 DIFFERENT CUTS IN 1 OPERATION

For many types of milling, light metals and plastics as well as steel, there is no longer need for special cutters. A single New-Field Universal Fly Cutter, utilizing any type of standard high speed steel or carbide bits, makes multiple cuts in one operation. In contrast with expensive specially ground cutters, the standard bits used in the New-Field are easily and quickly ground in your own shop, readily replaced or reground for other work, at small cost. There is practically no down-time if a bit is broken.

The New-Field fits all standard arbors, turns to any required speed for fly cutting, slotting, surface and straddle milling, gear cutting, disc and gasket cutting. Standard sizes are 4", 6", 8", 10".

Write today for details of this versatile, production-upping, money-saving tool.

NEW-FIELD MACHINED PARTS CO.
210 W. Seventh St. ..Los Angeles 14, Calif.

EDITORIAL INDEX

Editorial: only votes count 58

Fixture Design

"The Efficient Application of Special Fixtures to Standard Milling Machines" by E. P. Leeds, Brown & Sharpe Co. 61
Well-planned fixtures that conform to length of run can reduce floor-to-floor time and often enable the standard machine to match a special one in unit cost of the part.

Press Operations

"Cold Forming of the Stainless Steels" by Lester F. Spencer, Landers, Frary & Clark 62
The second portion of Mr. Spencer's article covers a wide range of bending operations.

Machining (boring)

"Stepped up Production on the New Britain Boring Machine" by J. Walter Hansen, Haber Corp. 64
One boring machine in one shift equals former production of five turret lathes working round the clock.

Short Run Stampings

"Pressed Metal Institute, Third Spring Technical Meeting" reported by Carl F. Benner, Assistant Editor 66
The different methods in use for tooling for short run stampings were the panel discussion topics at this technical meeting.

Machine Tool Design

"The Engineering and Development of a High Speed Surface Broaching Machine" by E. C. Raehrs and E. J. Rivoria, The Cincinnati Milling Machine Company 68
A detailed description of how a large machine capable of developing 450 H.P. was designed for carbide tooling and 200 ft./min. cutting speeds.

Sheet Perforating

"Hole Punching Capacities of Interchangeable Punches and Dies Broadened" 70
Descriptions of quickly-made setups, working directly from blueprints and without templates.

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

Tool Repair

"Salvaging Broaches and Milling Cutters by Welding" by Arthur L. Phillips, Eutectic Welding Alloys Corp. 72

An enlightening discussion as to what constitutes waste or scrap.

Fabricating

"Drivematic Riveter Speeds Aircraft Riveting" 76

An assembly method for aircraft skin panels.

Machine Tool Lubrication

"Machine Tool Lubrication" by J. R. Keen, King Machine Tool 132

The introduction of carbide tooling and the development of high speed machine tools.

—shorts—

New Roller Saves Time, Offers Bending Versatility 86
Important for Good Grinding 114
Symposium on Large Forgings and Extrusions 116
Small Self-Contained Drilling Unit 118
Precision Castings Procurement 130
Copper for Horseless Carriage 142
Efficient Materials Handling 149
Inclined Fixture for Welding 164
Vertical Spindle Surface Grinder 164
Flexible Shaft Drive 168
Cleaning and Peening Gears 170
Hand Router Jigs 182
Gage Block Selection 184
PDQ Surface Grinder 184
A "Peacetime" Drawing and Forming Press 194

—departments—

"PUBLICATION PREVIEWS" 120

Here's a wealth of information, but too much to carry in your head.

"SHOP AIDS" 144

We've briefed the content of these catalogs to save you time in getting information on your requirements.

"PROGRESS ON PARADE" 172

Each and every one of these new machines, tools and accessories is capable of saving money or increasing productivity.

"QUICK-PIC CATALOGS" 186

Here we've practically put some of today's newest literature up on a rack ready for you to take your pick.

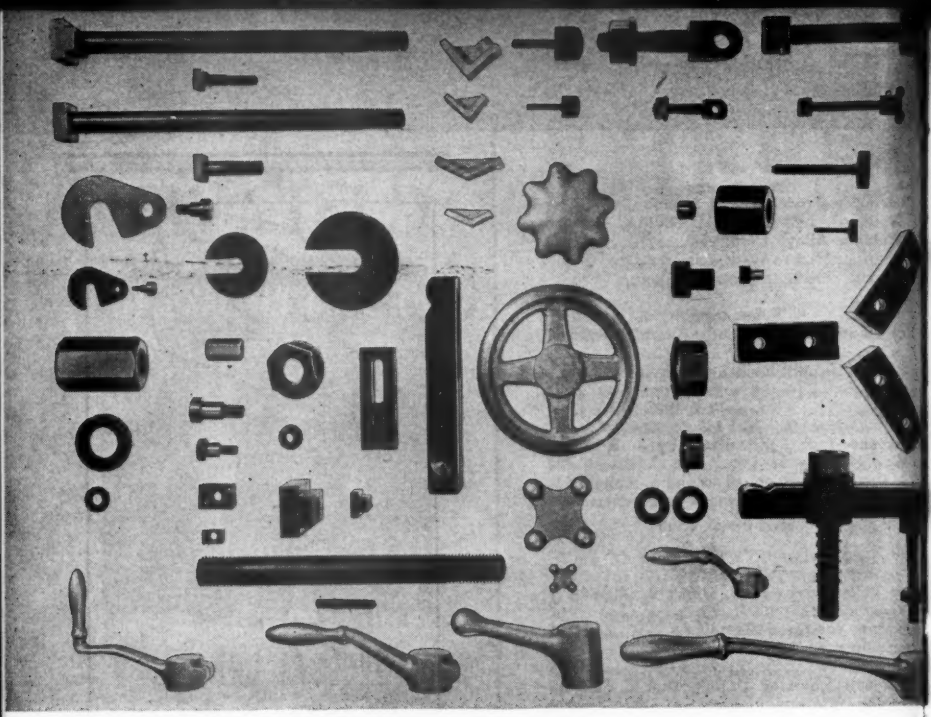
UNIVERSAL DRILL BUSHINGS establish new standards of high quality

Universal Drill Bushings, produced at the big, modern plant of the Universal Engineering Company, have been first in industry for more than 25 years. They are accurately machined with superhoned bores from the finest quality steel. They are carefully inspected to insure maximum efficiency and extremely long life. Write today for complete information.

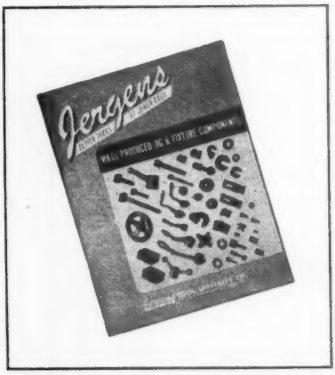
The modern home of finer production tools

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 8, MICHIGAN 156-B



ECONOMIZE WITH JERGENS MASS-PRODUCED COMPONENTS



Yes, economize in man hours—save skilled tool room personnel—valuable time of designers, increase production and save up to two-thirds the cost using Jergens Mass-Produced Components as standard in your plant.

The Jergens' line of standards is one of the most complete lines of its kind in production today. There is no compromise on quality. Each item is precision made of heat-treated alloy steel with anti-rust black penetrate finish. Jergens' Standards hold-up in the toughest applications usually outlasting the jigs and fixtures on which they are used.

There's over 375 Jergens' fixture parts plus strap clamp assemblies—chuck jaw blanks and the cast aluminum line of hand wheels, levers and knobs.

Write today for Jergens' New Folder TP-8

Jergens TOOL SPECIALTY CO.

712 E. 163rd ST. . . . CLEVELAND 10, OHIO

only votes count

Your vote is the tangible evidence of your acceptance of the duties and responsibilities of citizenship. It means that, by registering in your voting precinct, you have put yourself on record as desiring that your voice be heard in the selection of those who are to be charged with the counduct of our affairs; local, state, national and international.

When you cast your vote your voice is heard, and when the votes are counted you find that your views, your desires as to how our country shall be run and who shall run it, are the wishes of either the minority or the majority.

We are steeped in thinking of our country as a true democracy, subject to the will and rule of the majority. But right there is the catch, the majority. Majority of what? Majority of your fellow citizens? No! Majority of those eligible to vote? No! What then is it that gives us a duly elected, representative government, "of the people, by the people and for the people."?

It is simply a majority of the votes cast; votes cast by those who "bothered" to exercise their right, duty and privilege of citizenship.

The government and governing that we get is determined soley by those who vote; it's just that simple. We get what the majority of votes cast calls for, no more, no less. It's votes that count, and only votes are counted; not gripes, not wishful thinking, not oratory, not promises, not handshaking and baby kissing, and not mere intentions, just votes. One vote, two votes, three votes, and up into the millions.

So, when we cast millions of votes we think that's democracy at work . And when things go wrong it is much easier to blame the elected office holders rather than ourselves, we who elected them; particularly, we who elected them by not voting!

As citizens of a "majority-ruled" democracy how do we rate as voters? How do we do in determining that the majority shall rule? How do we compare with the citizens of other democracies? The answers are jolting, shameful and disgraceful!

In the national election of 1948, 48,680,416 votes were cast; an all time high. Can we smugly say that 48 million people are enough to "run the country."? Not when those 48 million voters represent only 51% of the citizens eligible to vote! Not when over 46 million of our fellow citizens fail to exercise their citizenship! And here's the election record of several foreign elections held since our 51% performance: Canada, 75%; Belgium, 90%; Japan, 71%; Israel, 72%; Sweden, 80%; England, 83%!

In 1948 the Democratic Administration was returned to office with a little over 24 million votes cast; on that election day a mere 25% of our citizens who were eligible to vote "ran the country"!

Since then we have reached an all time high in governmental deterioration; corruption, mediocrity, inefficiency, inept statesmanship, extravagance and waste. At the same time, as government has decreased in stature and integrity it has increased in dictatorial and bureaucratic power. All of this now threatens our individual freedoms, our national solvency, and our very ability to defend ourselves.

It is inconceivable that a true majority of our citizens can or will tolerate any longer this endangering of our very existence as a free people. To bring about our salvation the 1952 vote must be that of a true citizen majority, not a scant voting majority. The basic principle of our whole system of government is that decisions shall be made by all the people through their votes.

Our individual duty now transcends that of merely voting. We have learned (the hard way) that our one vote isn't enough. Each and every one of us must work to get more votes cast. We have a selling job to do; selling the idea that only an actual majority can express the will of the majority. For this job of selling there is no lack of prospects. They will be found among 1948's 49% who didn't vote and among 1952's 29,000,000 who, as of January 1st, weren't even registered to vote!

Never has there been a bigger job, but never have the stakes been so high!

E. Willard Pennington

editor

WESSON METAL IS PRODUCING

MANY MORE "CONTROLLED" LOTS

OF WESSONMETAL

TO MEET THE EVER INCREASING DEMAND FOR THIS IMPROVED CARBIDE!

WESSONMETAL

★ Solid Carbide Blades
★ Standard and Special Carbide Tips
★ Solid Carbide Shapes

6 STANDARD GRADES . . . 2 SPECIAL GRADES
TO MEET HIGH SPEED AND HIGH FEED RATES
OF MODERN MACHINE TOOLS

Uniform dependability is maintained in Wessonmetal because it is quality controlled by Wesson's exclusive method of small lot production. Each lot is carefully processed—rigidly inspected to maintain uniformity—highest possible quality. Whatever your needs in Solid Carbide —you can depend on Wessonmetal for Quality, Economy and Efficiency.

Write for Bulletin

WESSON METAL CORPORATION
Lexington, Kentucky
Affiliated with WESSON COMPANY

PIONEERS IN THE ART OF DESIGNING AND PRODUCING CARBIDE TOOLS

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

The Efficient Application of Special Fixtures to Standard Milling Machines

In the application of special fixtures, holding devices and other accessories to standard machines, the overall cost of equipment which is reflected in the unit cost of the part is of paramount importance. This cost factor has always been of extreme significance and is the basis for a proper analysis of the advisability of using a fixture. It is also the basis

by **E. P. Leeds**
BROWN & SHARPE COMPANY
Providence, R. I.

for the determination of the type of fixture and has a direct bearing on its design.

Today, because of the greater demand for entirely special machine tools and the consequent long deliveries, it is often more desirable to apply special fixtures to standard machine tools which are available. The proper fixtures, when applied to standard machines, will often produce parts as economically as they can be produced on entirely special equipment.

In view of the rapid strides being made today in faster machining techniques, it is of particular importance that fixtures be designed which can be rapidly loaded and unloaded. We have known for a long time that an increase in feed rates, even though of a spectacular nature, does not always reflect a great saving in floor-to-floor time which of course represents the total cost of producing a certain operation.

There are certain fundamentals which must be observed when contemplating the design of a fixture. Before planning the design, it is necessary to compare the cost of production of the work using present tools and equqipment, with the expected cost of production using the fixture to be made. The cost of building such a fixture, must not be in excess of expected gains. Before laying out the fixture, we must decide on the locating

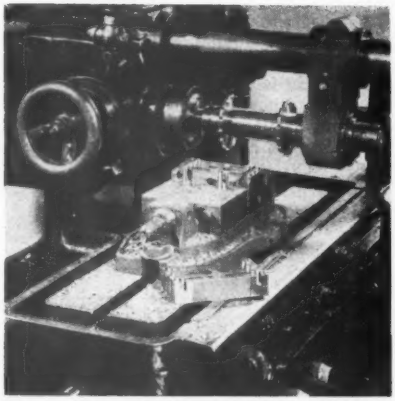


Fig. 1. The parts being slotted in this block fixture are made of brass. The cutter is 3" dia., convex, running at 550 rpm or 436 sfpm. Feed rate of 6-11/16 ipm is equal to .0012" per revolution.

points and outline a clamping arrangement. All clamping or binding devices must be as quick acting as possible. In the selection of the locating points, it is advisable to have two component parts of a machine that can be located from corresponding points and surfaces. The fixture should be made "foolproof"; that is, it should be made so that the work cannot be inserted except correctly.

In the machining of rough castings, it is frequently necessary to make some of the locating points adjustable. The clamps should be so located that they will be in the best position to resist the pressure of the cutter when at work and should be made integral parts of the fixture. They should also be made as simply as possible and placed opposite the bearing points of the work to avoid springing. These are standard when considering fixtures.

Illustrated here are several types of fixtures that can be used in conjunction with standard machine tools to efficiently

(Continued on page 80)

Cold Forming of the Stainless Steels

(continued*)

Group II

Bending is one of the more frequent operational procedures within this group; either single or multiple bending being performed in a number of methods. In the forming of straight sections where high production is the rule rather than the exception, either roll forming or drawbench forming is used. Either the power brake or the press having a long narrow bed is utilized in the forming of items where production requirements are low. Thus, the above equipment can be used in the production of straight flanged parts, however the forming of curved sections presents a more difficult problem. The methods employed in the bending of curved sections according to Krivobok and Sachs [1] can be divided into the following subtypes:

by **Lester F. Spencer**
Chief Metallurgist
LANDERS FRARY & CLARK
New Britain, Conn.

(a) Hand bending and bending by means of presses and hammers are methods in which the forces are usually applied at three definite points with two, but sometimes one, of the three points being stationary.

(b) Roll bending is a method in which the bending is performed progressively, with the rolls usually serving as a means of advance, or feeding.

(c) Wiper type bending, often termed wrap forming, is a method in which the section is forced to assume the curvature of a formblock or die, by progressively pressing it against the formblock, by means of a wiping block, a slide block or roll. This type of bending is usually performed either by a hand bender or on a power bender.

(d) Wrapping or wrap forming can also be performed by hand, however it is usually carried out by machine.

In bending, compressional and tensional stresses are involved in the same part, each being diametrically opposite to the other in reference to the neutral axis. Upon the application of a deformation pressure which is beyond the elastic limit of the material, there is a shift of the neutral axis toward the compression side; the deformation resistance increasing on the compression side accompanied by a like decrease of resistance on the tensional side. The net result is that a reduction in both the thickness and the cross section is experienced on the tensional side.

In the bending of the austenitic stainless steels, one must fully realize the work hardening characteristics of these alloys and that in a bending operation a difference in hardness will develop in various sections of the formed piece. This will be evident by either uncontrolled distortion or springback. Proper bend radii must be employed in reference to the original hardness of the material and the thickness of the stock. Springback control can be obtained to some extent by proper design of tools. Table II indicates values for bend radii, bend diameter and angle of bend; close examination revealing that the higher the temper, the greater will be the values for bending. In the event of a pinched bend, the procedure as illustrated in Figure 4 can be employed.

In some instances, the use of highly polished stock is advisable especially in

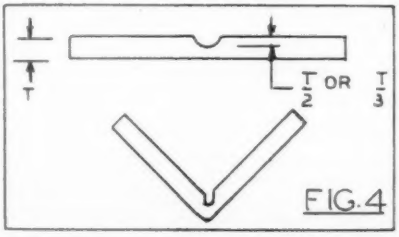


Fig. 4. The procedure illustrated can be employed when a pinched bend has to be produced.

* See page 80, Tooling and Production, June, 1952.

Table II

Bending Properties of Stainless Steels According To Army-Navy Aeronautical Specifications AN-QQ-S-772a and AN-QQ-S-757 For Corrosion Resistant (18 Cr-8 Ni) Steel Plate, Sheet and Strip.[11]

Type	Temper*	Thickness—T Range, Inches	Bend Radius R T	Bend Diameter 2R T	Angle of Bend Degrees
301 302 304 316 321 347	A—Annealed	All	½	1	180
	B—¼ hard	0.050 & under 0.051 & over	½ 1	1 2	180 90
	C—½ hard	0.050 & under 0.051 & over	1 1	2 2	180 90
301 302 304	D—¾ hard	0.030 & under 0.031 & over	1½ 1¾	3 2½	180 90
	E—hard	0.030 & under 0.031 & over	2 1½	4 3	180 90
	B—¼ hard	0.050 & under 0.051 & over	1 1	2 2	180 90
316	C—½ hard	0.030 & under 0.031 to 0.050 0.051 & over	2 3 2	4 6 4	180 90 90

*Definition of Temper

	Tensile Strength, psi		Yield Strength, psi
	Min.	Max.	0.2% (min.) offset
A:	75,000	110,000	30,000
B:	125,000		75,000
C	150,000		110,000
D:	175,000		135,000
E:	185,000		140,000

applications where the finished form is too intricate for subsequent polishing. However, it is conceivable that if no precautions are taken during the forming operation, the high finish employed will be marred and its ultimate purpose being defeated. Thus, in some instances, the use of a thin plastic coating can be used; a number of formulations being on the market which serves both as a lubricant and as a protective medium. In many instances, this coating can remain even during shipment. The use of either wall paper or a good quality of kraft paper can also be employed; this being pasted on the blanks. After this coating has dried, layout and simple forming operations can proceed in the normal manner without abrading the finished surface; removal consisting of merely soaking in warm water. In the application of a protective coating, it is desirable that the surface being protected be free from foreign material; small dirt particles of semi-hard consistency will leave a definite impression in the polished surface even though it is suitably protected. This same precaution also applies to the paste employed; a good quality paste mixed with water to a smooth consistency being applied.

Draw rolling consists of pulling or drawing strip or narrow lengths of sheets, through idle forming rolls made from hardened steel; this process being used to a large extent in the forming of high tensile austenitic stainless, type 301. This process can be also employed in the forming of channels and angles where production quantities are too small for conventional hot rolling procedures. In draw rolling there is no strain on the material, other than that of forming, [11] and the metal can flow naturally into the desired shape. Idle forming rolls permits slippage and avoids the difficulties of draging and sticking that would otherwise be encountered in attempting to draw a material such as the high-tensile type 301 through fixed dies. Drawing through fixed dies, however, is not completely excluded since it may be used for straightening after the final pass through the rolls and to maintain the shape of the interior of a section. Ordinarily, gages from 0.002 to 0.030 inches are employed in draw rolling; heavier gages

(Continued on page 74)

Stepped Up Production on the New Britain Boring Machine

by J. Walter Hansen
Chief Engineer
HABER CORPORATION
Chicago, Illinois

The job tooled up on the New Britain boring machine is a zinc die cast part shown in Figure 2.

The production needed daily warranted a high production setup. It previously was done on five turret lathes, each one operated by a male operator. In order to get out the daily requirements, these machines had run three shifts, making a total of fifteen male operators—each producing forty pieces per hour.

The New Britain boring machine is a two spindle machine which chucks this part internally on specially designed arbors. These arbors are operated automatically by air cylinders. The machine is operated on this set-up at 2283 rpm or 1840 fpm. In following the different tool paths shown in Figure 1 and described in the following paragraph, bear in mind that all tools are permanently mounted on the table and all move through the same cycle, cutting only on their own particular section of the cycle. All movements are controlled by a special master cam.

Operation 1—The boring tool "A", as shown in Figure 1, follows direction of arrow and rough bores hole at feed of .0055. Then tool "B" finish turns the part to 3.062-3.064 OD. The cam then moves the boring tool over slightly and finish bores the .468-.4685 hole with the same tool "A" on its return stroke. Tool "C" faces front end of piece with feed of .004. Tool "D" then follows cam and bores the large 2.871-2.873 counterbore

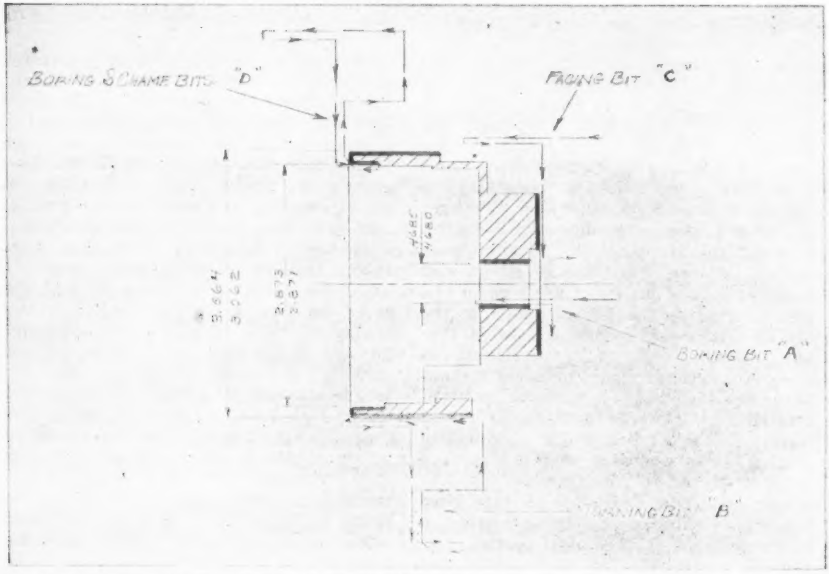


Fig. 1. Diagram of the paths followed by the different tools as they move through one cycle of boring, turning, facing and chamfering.

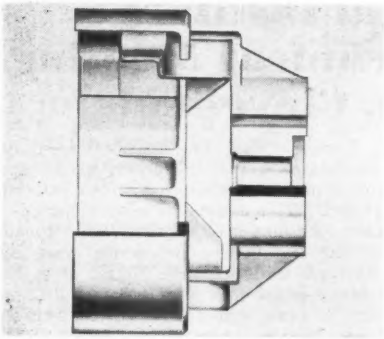


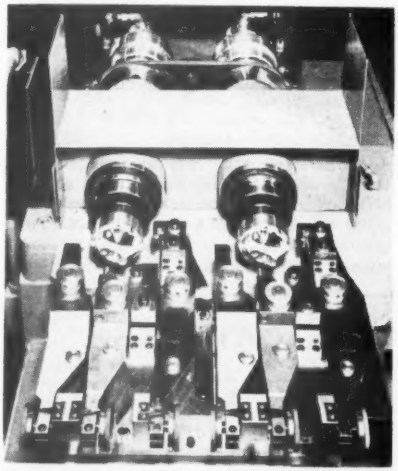
Fig. 2. Zinc die cast part machined on a two spindle boring machine.

diameter, also faces the back end of the piece. The last tool is then retracted and the machine comes to a full stop and the air operated arbors release the piece part. All these operations are done automatically at a rate of 175 pieces per hour. The individual tools are all adjusted with large micrometer adjusting screws. This is usually done only once a day. Tool sharpening is done approximately every 50 hours of production.

The New Britain boring machine has replaced the five turret lathes previously used and has maintained the production requirements on one shift. One girl operates this machine now, therefore this releases the turret lathes and fifteen male operators for other production jobs.

Another benefit realized by using the New Britain boring machine is the increase of quality and superb micro finishing. The center .468-.4685 hole is held easily. On the turret lathes we had great difficulty in maintaining the size of this hole constantly throughout the day. The expense of reamer maintenance was also high. The concentricity of all diameters turned are held to within .001 F.I.R. On the turret lathes we had great difficulty in trying to hold concentricity to .002 F.I.R.

The pictures and diagrams illustrate the part and operations performed with the exception of some drilling and tapping which is done on standard equipment.



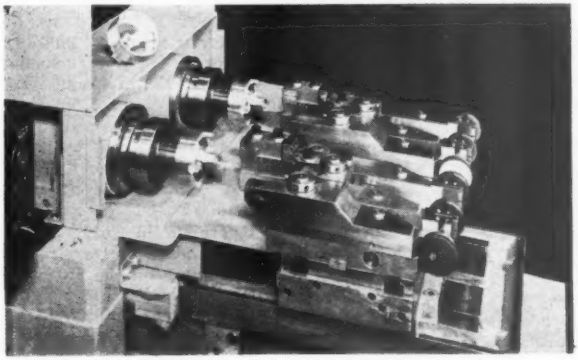


Fig. 3. Above. Top view of the New Britain two spindle boring machine showing four cam actuated tool holders set up for each spindle.

Fig. 4. Left. Front view of the boring machine with the tools retracted and two work pieces loaded ready for the machining cycle.

Photos Courtesy: New Britain Machine Co.

Pressed Metal Institute Third Annual Technical Meeting Carter Hotel, Cleveland

Tooling for Short Runs

One of the sessions of a two day meeting covered a panel discussion on "Tooling for Short Runs."

Moderator of the panel was C. C. Caditz, Northern Metal Products, and the panel members were Byron Nierenberg, Hydropress, Inc.; K. P. Martin, Cincinnati Milling & Grinding Machine, Inc.; J. C. Rumbarger, S. B. Whistler & Sons, Inc; Peter Kilham, Perkins Machine & Gear Co.; T. K. Reid, H. P. L. Manufacturing Co.; Henry R. King, Masonite Corporation; and John Cummings, Wayne Foundry & Stamping Company.

Marform

Mr. Nierenberg, Hydropress presented the discussion on the Marform process.

"Marform aims at the possible elimination of most of the tooling, particularly the expensive part of tooling for short runs. It eliminates it by not needing a

Reported by
Carl F. Benner
Assistant Editor

female die, in accomplishing deep drawing of heavily contoured parts. The female is a rubber pad, a heavily pressurized rubber pad being universally adaptable to a male punch, the punch having the shape of the part to be made.

"We feel that it not only eliminates the manufacture of the female, the matching of the two ways of the machine which is usually time consuming and costly, but it eliminates, for example, things like difficulty with try-out presses. It also has a considerable amount of adaptability in eliminating the nuisance values of slight changes, which poses one of the greatest troubles in making dies that will finally accomplish the part."

Questions and Answers

Question: "How is this accomplished, is it a machine operated unit?

Answer: "Yes. The machine essentially consists of a rubber bucket, a container inside of which laminated rubber pads are placed. This entire bucket is bolted to an upper platen of a press. Underneath, on the bed of the press, we place our Marform units. These consist of a stationary punch and some moving platform pins or rams, which serve to transmit the force to the part being formed. The machine essentially then is a press. It also is available as a package unit which can be provided for on existing press."

Question: "Are there any Marform contract shops in the country?"

Answer: "Unfortunately, there are not too many companies who have Marform time available. About the only one I can think of is the Worcester Pressed Steel. The reason for this is that the purchase of the Marform press usually has been predicated by long range planning, production planning, and those companies who have Marform presses are heavily overloaded with their own requirements."

Question: "Will you tell us about Marform from the viewpoint of space and dollars?"

Answer: "That's a tall order. The range is wide. Spacewise, let's just use average figures. Projected floor space might be three feet by three feet; height, a good average figure might be six or seven feet. Moneywise, well, possibly anything from sixty or seventy thousand dollars up to a half million dollars. That is a long range."

Question: "What is the approximate production rate, however you want to measure it, in the development of the part you make? Do you make one an hour or ten or 100 or 1000?"

Answer: "Let's think in terms of a fifty-second cycle. That is a good rough figure—40, 30, depending on the part you are making. It would be in that range."

Question: "What is character of the metal thickness that you can use?"

Answer: "The ranges are rather wide. I think we have Marformed up to about .6 of an inch, and some to about .010 of an inch."

Question: "In steel or aluminum?"

Answer: "In both. The thicker gauges give us less trouble because of the better flow characteristics."

Question: "Is this machine intended primarily for drawing work?"

Answer: "Not primarily, no. It will facilitate drawing work to a great extent. The usual parts that are slated for steel dies or drop hammer, and which would include contour parts, and complicated contour parts, would also be natural for Marform."

Question: "There are two questions. On a 3-inch draw by 4-inch diameter, first, how long would your rubber pad last? Second, what is your method of adapting to a standard press? You spoke of an adaptation to a standard press. What would that cost?"

Answer: "On the rubber aspect, thinking in terms of the life, we don't know the life of the inner laminates of rubber, because none of them have worn out yet, in the years they have been in production. So we think of that as being indefinite. The outer layer, the layer which is in contact with the work being done, will go eventually.

"The number of cycles that it can stand up, of course, is a function of the parts being made, but when it does go, it goes in the form of nicks and scratches. The usual procedure then is to take that outer layer of rubber and turn it over, run it for another year and pick up some more scratches. Finally, it is a matter of just not looking right, and you take it out and put another in. I think that adequately covers it.

"The second question is the matter of adapting it to an existing press. In the case of an existing hydraulic press, with sufficient bed area and sufficient daylight, there are Marform package units completely self-contained, with all the hydraulics and electrical components included. These can be installed easily into existing presses. The advantage we feel is that when you are through Marforming, you can remove the Marforming unit and go about your every-day business. That advantage also exists in the standard Marform press. The Marform components can be removed, then you have a steel die-drawing press, a standard drawing press available."

Question: "From the cost expressed by Mr. Nierenberg and cycle time—I think you partly answered my question—however, I wondered if this process could be applied to a standard straight-sided or gap type press. Is it a unit to use in a small job stamping concern, rather than to buy the press, and whether you could get a unit that could be used in a standard press at a higher cycle time."

Answer: "The speed of operation, of course, is a straightforward figure of the mass of material that you are moving, the flow of hydraulics through pipes, the valving, the pumping—the speed is as good or better than comparable presses. At least, the considerations are."

Question: "I still want to ask: Can it be used as a standard operation rather than as a short-run proposition?"

Answer: "It is being used as a standard operation at this date. It is being used all over as a standard operation. I certainly did not mean to imply that it is a fill-in gap for short-run operations only. It does adapt itself very nicely to short-run considerations. It is basically, for that kind of money, a standard press."

Question: " What kind of tolerances can be held with this method?"

Answer: "That, of course, depends upon the material and the gauge. We can think in terms of .005 without any trouble at all. We can also think in terms of as close as .002."

Question: "Does the thickness of the material have a bearing on that?"

Answer: "Yes, to some extent; the flow characteristics."

Question: "On a drawn shell, do you hold the walls of the shell rather straight?"

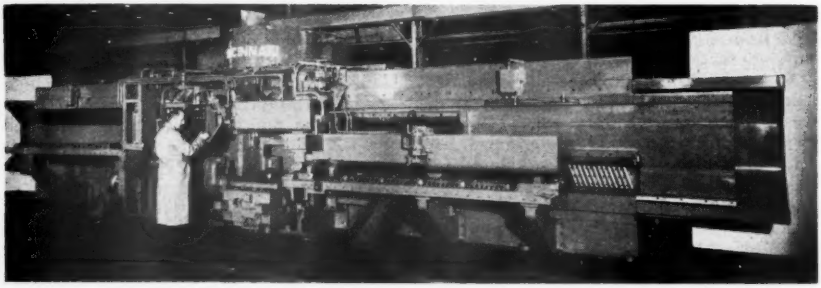
Answer: "Yes."

Question: "Do the standard lubrication problems and tonnage figures still hold for draws using this process, and what would be the smallest tonnage job that would normally be practical to use this unit on?"

Answer: "On the lubrication problem, I am at a disadvantage. In fact, I would like to learn. All of you fellows know a lot more about that consideration than I do.

(Continued on page 88)

Fig. 1. This machine tool symbolizes the design, engineering and manufacturing skills essential to meeting our economy's demands for higher production at lower costs. Is it big? When we consider that its 90 tons occupy approximately 19' x 51', the answer is yes. But when we learn that this represents a tremendous saving in floor space over previous methods of obtaining equivalent production, the answer is no. Its 450 hp puts carbide tools to work on cast iron at 200 ft./min. compared to the former 37 ft./min.



The Engineering and Development of a High Speed Surface Broaching Machine*

by **E. C. Raehrs**
and
E. J. Rivoira
The Cincinnati Milling Machine Company
Cincinnati, Ohio

In today's dual economy, the ever increasing need is for more production at lower cost. Executives of metal working plants have been intensifying their search for new and improved ways to increase productivity, and have found that broaching offers a number of distinct advantages over more conventional machining methods. The result has been and will continue to be a wider application of broaching wherever conditions are favorable.

The rapid rise of the process has been due to two factors: (1) broaching's ability to remove metal faster than any other comparable method, and (2) it can produce machined surfaces to a high precision and finish. Its application is usually limited to surfaces parallel with the axis of the cutting tool, which have no obstructions in the plane of the broached surface, and where the part is strong enough to withstand the required broaching thrust or can be adequately supported.

In 1934, a special horizontal broaching machine was developed by our company to perform various operations. This machine was hydraulically operated, utilizing 5 hydraulic pumps, each driven by a 30 H.P. motor. The cutting speed was 37 ft./minute, with a resultant production of 55 to 60 parts per hour. A set of cutting tools for one of these machines costs the customer approximately $5000. That was a lot of money for tools in those days, especially when you consider that the user was fortunate to run them for 5 days between tool changes. Also, foundries were unable to hold a specified amount of stock removal and maintain material of good cutting qualities. This resulted in much tool breakage and discouraged customers.

In spite of some discouragement in the early days continued progress has been made until today, broaching is considered one of the important methods of machin-

*Contributed by the Machine Design Division for presentation at the Semi-Annual Meeting of The American Society of Mechanical Engineers, Cincinnati, Ohio, June 15-19, 1952. Presented here by courtesy of the Society.

This paper is timely due to our dual economy which increases the need for more production at lower costs. When product design permits, broaching offers distinct advantages toward this goal. This paper describes in detail how a large machine capable of developing 600 H.P. was designed to take full advantage of tungsten carbide cutting tools, thus increasing the machine cutting speed from 37 to 200 feet per minute.

ing. Progressive developments have resulted in a machine capable of using tungsten carbide cutting tools for cast iron operations, utilizing cut time speeds up to 200 ft./minute, in comparison to the former 37 ft./minute. Production obtained from these machines is over 150 pieces per hour on some large parts requiring only one operator, who keeps two men busy loading and unloading. Tool life has increased from approximately 4000 pieces per grind to 50,000 pieces per grind and in one case as high as 150,000 pieces per grind before sharpening was necessary.

Figure 1 shows a Cincinnati horizontal two way broach, machining an automotive cylinder head. This machine weighing approximately 90 tons is capable of developing a peak of 450 H. P. It occupies a floor space of approximately 19′ x 51′, a tremendous saving in space over previous methods of obtaining this production. When shipped, it was a full capacity load for a 45 foot flat car. The function of this machine is to rapidly remove a large amount of metal, from a securely held rough forging or casting, to an accurate surface finish in one pass of successive broaching tools.

The first procedure in the design was the outline of requirements and review of past performance. Some of the factors considered were:

(a) Power requirements based on maximum amount of stock removed and maximum cutting speed.

(b) Fixture and Tool requirements.

(c) Material handling.

The basic design was blocked out to determine:

(d) Principles of operation and the relation of various units.

(e) Type of drive to meet the requirements.

(f) Principles of the work holding and method of work movement.

(Continued on page 84)

Fig. 2. This view shows the two ram ways. They are constructed of 6½″ x 9½″ rectangular hollow high grade cast iron sections, hardened and surface ground to within .0002″ on thickness.

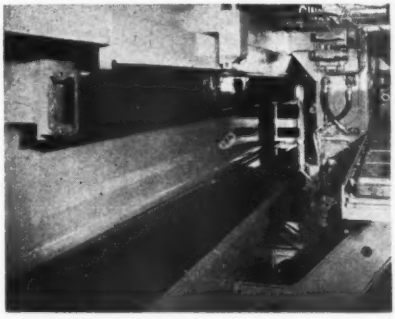
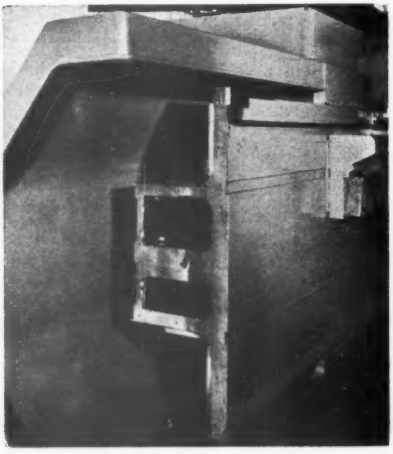


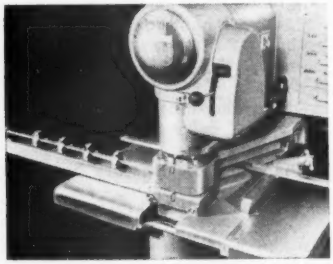
Fig. 3. The reciprocating ram, of modified box construction, is built up from 3″ plate, 43″ wide and 24′ long. Three 2″ x 12″ members extend the full length of the ram. Complete unit, weighing 12,000 lbs., is stress relieved.



Hole Punching Capacities of Interchangeable Punches and Dies Broadened

A new holder of increased die capacity has been developed for use with the Wales sheet metal fabricator. This fabricator punches and notches mild steel up to ¼" thick with dimensions taken from blue prints or operation sheets—thus no templates are required.

The new 3½ holder is designed to fit into the bed channel of the fabricator and does not have to be removed during the interchanging of punches and dies. Rapid setups and consequently faster output of parts requiring larger diameter holes is made possible by the holder which punches various diameter round and shaped holes up to 3½" in diameter.



Photos courtesy Wales-Strippit Corp.

Fig. 1. Illustrating the 3½ holder for punching various round and shaped holes up to 3½" diameter.

The holder is a machined aluminum casting for lighter weight and quicker, easier handling. The T-section design of the holder arm provides torsional strength in all directions. A steel bushing in the punch guide holes of this holder head accurately guides and assures long life of the punches and dies.

Faster interchangeability for punching, notching and nibbling is one of the outstanding features of these fabricators. The holder automatically aligns punches and dies. With each punch, a set of dies is provided to meet the clearance requirements of various types of material and various thicknesses of stock.

The adjustable back stop and finger gauges assure exact duplication of hole and notch locations in each piece of the work. The large work table permits left to right feeding and stacking with a minimum of motions.

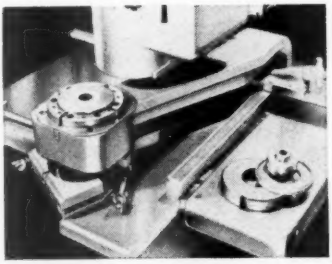


Fig. 2. Illustrating the new 3½ holder with die head partially opened for interchanging various dies. Note the set of interchangeable punches and dies on table at right.

Wales fabricators are specially designed to permit the use of standard Type "BL" hole punching units and Type "NA" notching units.

One of its many outstanding features is the Hydra-New-Matic head which operates with a minimum of vibration and noise at 165 strokes a minute. This head is

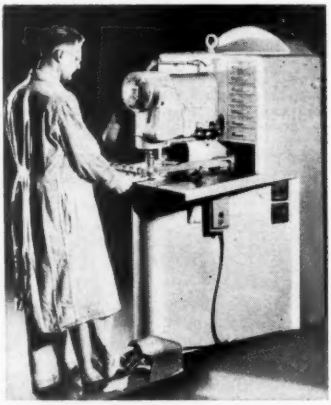


Fig. 3. Showing right side and front of Wales fabricator.

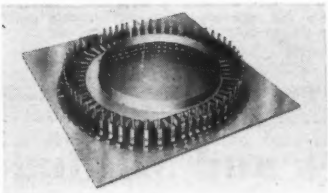


Fig. 4. Showing a template setup of Type "H" hole punching units for punching holes up to ¼" in diameter in the Aircraft Engine part shown nested in position.

revolutionary in its simplicity of design and operation.

Dual control of the ram strokes is provided by an adjustable foot trip mechanism for use when both operator's hands are required to feed work or when large sheets make it awkward to use the hand trip lever. The foot control may be freely placed at any point within four feet from outlet in base.

Type "H" hole punching units are further new developments at Wales which are designed for punching holes in flanges, angles, container sides and similar shaped and formed work. Punching holes in the side of the work instead of on top of the flat surface is made possible by designing these units so the punches move back and forth horizontally rather than up and down.

These units eliminate expensive, built-up, single purpose, cam-action dies. Each type "H" unit is independent and self-contained which permits the same group of units to be used and re-used, place and replaced on press brake rails and on templates in stamping presses and press brakes. All parts—punch, die and stripping spring are held as a unit by the holder. In addition, the holder assures perfect alignment of punch and die which eliminates the many hours customarily required to align conventional dies.

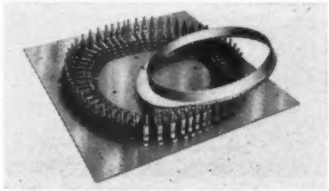


Fig. 5. Showing above setup with the Aircraft Engine part removed with holes punched around the side and flange.

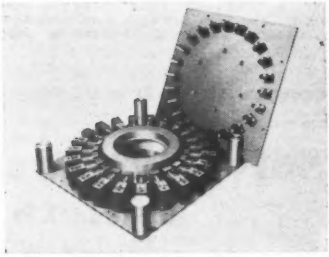


Fig. 6. Showing a template setup of Type "H" hole punching units for punching holes up to ⅝" in diameter in another Aircraft Engine part which is shown nested in the setup.

Press "downtime" between production runs is reduced to an absolute minimum by setting up the patterns outside the press. In this way, no setup time is required after the setup is placed in the press. This is made possible because nothing is attached to press ram.

Punches and dies are removable from the unit for sharpening and replacing. In cases of replacements, the entire unit may be removed and replaced quickly in the setup without disturbing the other units or the other parts of the setup. With a few extra units, it is possible to interchange a unit rather than stop a production run to replace or sharpen a punch or a die. Dulled punches and dies, in this way, may be sharpened at a more convenient time.

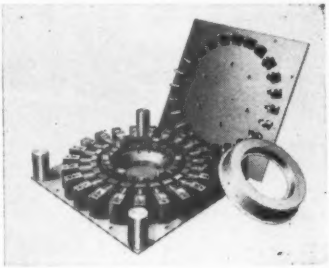


Fig. 7. Showing the above setup with the Aircraft Engine part removed with holes punched around the side and flange. Note the hold-downs on template in background to eliminate buckling during the hole punching operation.

Fig. 1. A blank was joined on to the broken puller-end of this keyway broach and subsequently threaded. The high strength bond obtained made possible the recovery of much valuable material, which formerly had been discarded as scrap.

Salvaging Broaches and Milling Cutters by Welding

by Arthur L. Phillips
Technical Information Service
EUTECTIC WELDING ALLOYS CORP.

An internationally famous condiment manufacturer admitted that his millions were not made by the amount the customers consumed, but by the quantity they wasted.

American industry is the most productive in the world; it is also the most wasteful.

The larger corporations have been giving serious considerations as to what constitutes waste, or scrap, and what constitutes repairable material. The result has been astounding. Millions of dollars worth of valuable equipment and tools yearly are found thrown on the scrap heap when a simple welding repair would restore them to useful service.

A formula has been worked out by one company to determine a standard by which to measure the repairability of tools. In general, the company repairs all tools where the remaining service life exceeds the cost of the repair.

Previously, it was customary to scrap a milling cutter or broach if breakage occurred, but upon investigation it was found that a simple welding repair would save a costly replacement.

The volume of work performed by this company made broach breakage a frequent occurance and a fixture was designed for the repair of round and keyway broaches. In this operation correct alignment is vital, and end pressure enables close fitting joints to be made.

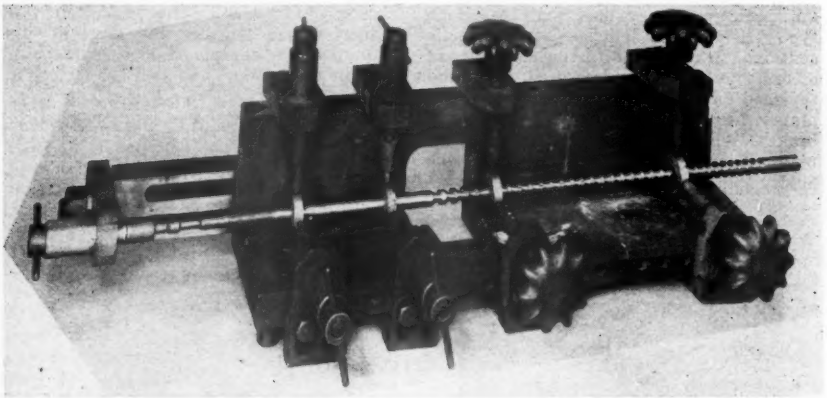


Fig. 2. This specially designed fixture enabled the broach to be kept in close alignment during the joining operation. The means of adjustment on the left held the joint to the minimum clearance by exerting light pressure.

The surfaces to be joined were ground smooth and the grinding wheel held to the edges to break the corners. This was an important step in such a joint because it permitted a fillet of alloy to fill the minute vee and thus insure flexibility.

EutecRod 16 was selected because of its high affinity for steel, and the high strength bonds obtainable. Temperature Indicating Flux 16 was applied liberally to the weld area and an oxy-acetylene torch used with a neutral flame. The melting of the flux indicated that the correct bonding heat had been reached and a small amount of alloy was melted on to the weld area. This thin-flowing

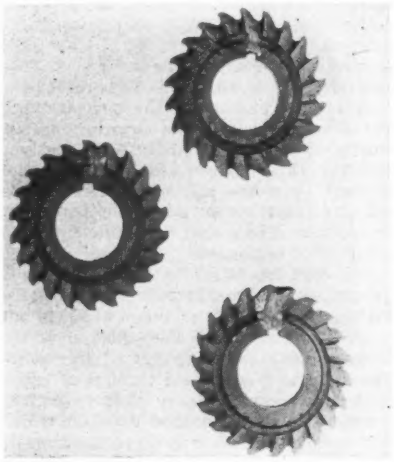


Fig. 3. The breakage of milling cutters became less serious when a method of repair was discovered which would not affect the properties of the metal and would quickly restore them to service.

alloy penetrated by capillary attraction and it was necessary only to maintain the heat on the joint area while slowly rotating the broach thus permitting the alloy to flow through the joint and to form a neat fillet all around.

This flow characteristic insures bonds of tensile strength up to 110,000 psi. The liquid flux, with its unusual wetting qualities, acts as a carrier. The flux wets the surfaces to be joined, however close together they may be, and wherever the flux leads the thin-flowing alloy will follow. If it is impractical to rotate the part, the alloy may be applied at one spot because it will follow the heat, and it is sufficient to play the torch flame on to the area to be joined to have the alloy follow, even vertically.

It was found possible to salvage the broken puller-end of keyway broaches by joining blanks to them which were subsequently threaded. The same technique was employed with the same EutecRod, and the results obtained fully justified the repair.

Milling Cutters

To successfully repair milling cutters a bond of the highest strength is essential. A faulty cutter could cause much damage and a serious injury to the operator. When correct joining technique is used these dangers are minimized and much useful material can be salvaged. The fracture and its immediate vicinity are thoroughly cleaned, and the corners broken to give the support and flexibility necessary. This breakage of the corners, as it is technically called, consists of widening the outside edges of the crack. The short space of time involved is amply repaid by the increased strength and flexibility of the joint. Joining procedure is identical to that already described. Clamps are used to keep the cutter in correct alignment and to keep the clearance to a minimum.

The low heat used to effect the bond does not affect the properties of the base metal and neither warpage nor embrittlement are likely. Where the strength of the joint depends upon surface alloying instead of fusion of the parent metal, all joints should be as close-fitting as possible, and a clearance of 0.002" to 0.003" is recommended. The salvage of tools is made possible by the low heat with which the joint is made. In many cases the cost of welding by conventional methods approaches the cost of replacement, with its preheating and postheating, and the danger of warpage and embrittlement. If the value of the service life of a part is the standard by which it is judged, than a simple inexpensive butt joint is going to reclaim far more material than the more involved conventional methods.

. . . Cold Forming, from page 63

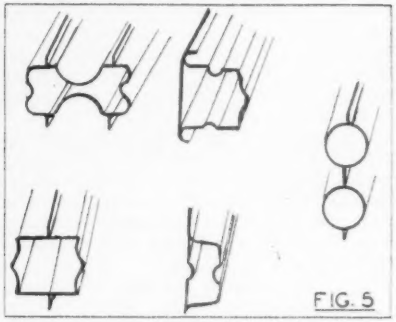


Fig. 5. Symmetrical sections and simple forms may be joined together by spot welding processes into more complicated structural members[11].

than that specified being seldom used since the chief reason in the use of the high-tensile stainless is to save weight. Cold rolled strip with tensile strengths of 180,000 psi may be draw rolled successfully.

While almost any type of section may be produced by draw rolling, it is advisable to design symmetrical sections and simple forms [11] which may be joined together by spot welding processes into more complicated structural members as is illustrated in Figure 5. Usually three stands or sets of rolls are all that is necessary to form most sections; each roll being mounted on a separate frame or housing to provide for individual adjustments. The axis of these rolls may be either in the horizontal or vertical plane. An example of a formed section produced by roll forming is illustrated in Figure 6; formation of this section beginning at its middle point with the first set of rolls, continuing the formation through successive sets of rolls, working outwardly toward the edges of the strip. Bends of greater than 45 degrees should not be attempted in a single pass.

In regard to the mechanism of roll forming, United States Steel [11] has the following to state, thus—"The convex radius on the roll determines the degree of curvature secured on the formed bead. Therefore, in rolling V-shaped beads, all forming is to be performed on the convex rolls, the opposing rolls having a countour designed to allow ample clearance of the formed bead. Spring back difficulties are avoided by small radii of curvature and by variation in the clearance allowed between the rolls. Edge guides are not necessary in the first pass. The bead formed in this operation is used to guide the partially formed section through the successive rolls. In designing the rolls, allow excess flange width. Frequently, subsequent development of a given shape may require additional operations, making a wider flange desirable. In this way the making of a new set of rolls may be avoided.'

The draw bench is of the conventional design using a heavy chain to avoid chatter; shear pins usually being provided as a protective device to avoid damage to spindles, gears, etc. when jamming should occur during operation. Electric power with sensitive speed control is employed; the control mechanism being located near the rolls, convenient to the operator who observes the passage of the strip through the drawing rolls. The drawing speeds employed will vary from 40 to 60 feet per minute; this factor usually being dependent upon the size of section that is being formed. It is advisable to mount the rolls on a base that has sufficient mass to avoid objectionable vibration.

The first operation in draw rolling is deburring a correctly slit width of the material by an edge trimmer which is but a series of hardened steel discs mounted perpendicular to the plane of the strip. The strip is then passed through a wiper made by wrapping heavy cloth or canvas around two bars clamped together which will remove grease, chips and particles of grit. The strip then passes through suit-

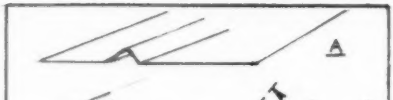


Fig. 6. Progressive roll forming of a simple shape[11].

Fig. 7. Battery of roll forming equipment. Courtesy: The Yoder Co., Cleveland, Ohio

able guides placed close to the first set of rolls, and then to the first set of forming rolls, which are separated to allow the strip to pass between without deformation. These rolls are tightened as the strip passes between them. The other rolls are also tightened gradually as the strip progresses until the final shape of the section has been obtained. The first set of rolls should be firmly clamped down to the base, the others being free to align themselves. They are then clamped down with the strip under tension. Camber or twist in the formed section may be corrected either by alignment of rolls or by straightening after which the formed sections are cut to length.

Cold roll forming consists of cold-shaping flat metal strip into a desired shape by passing it between progressive sets of forming rolls; each pair of rolls, set on a horizontal axis, forms additional contour in the part, until in the last roll pass, it reaches its final shape. The number of rolls that are mounted on a machine varies with the nature of the section formed and with both the type and thickness of stock; this factor varying anywhere from 4 to 20. These rolls are power driven and the equipment can produce a length of section limited only by the 'carry-off' length available in the individual shop or by the length of the coiled material. There is no 'dog' as in draw bench forming, and consequently, no lost motion in the return of this item is experienced. (See Figure 7)

No difficulty is experienced in the forming of the stainless steels; the martenistic, type 410, stainless forming vary similar to S.A.E. 2330, 3130 and 4130 compositions. Both the ferritic type 430 and the austenitic type 302 compositions are well suited for cold forming; the latter being especially adaptable due to its ductility and toughness. Usually the choice between these two grades of material is on the basis of its corrosion resistance, however both analysis can be used for similar applications. All of these compositions are formed at reduced speeds, varying from 25 to 75 feet per minute. Bend radii should be liberal and, in many instances where difficulty is experienced in cracking at any stage in the forming operation, correction can be obtained by merely increasing the bend radii at the roll where breakage is experienced. Inside radii should not be less than 1½ to 2 times the thickness of the stock. Considerable heat is generated during the forming of

(Continued on page 78)

Drivematic Riveter Speeds Aircraft Riveting

Aircraft riveting, which moved into the high-speed regime with the introduction and adoption of the General Drivematic Riveter, has been speeded still further at Temco Aircraft Corporation, Dallas, Texas with the development of an installation to permit pushbutton controlled lateral shifting of contoured skin panels, according to Robert McCulloch, Temco president.

The new installation already is saving from four to eight hours on P2V-5 wing panels which Temco is manufacturing for Lockheed Aircraft Corporation, and is permitting approximately 1,000 more rivets per panel to be pressed with the Drivematic than was previously possible. The Drivematic is also being used to drill out and replace the tack rivets used to tack skins to stringers.

Other advantages are: far greater accuracy than was previously possible, and a reduction in operator fatigue, which in turn has produced a significant decrease

Fig. 1. Original lateral shifting mechanism on Lockheed Drivematic table required operator first to loosen tension rollers with a hand-screw, and then shift the panel as shown above with a hand crank. These manual operations have been completely eliminated by the Temco developed remote control lateral shifting mechanism.

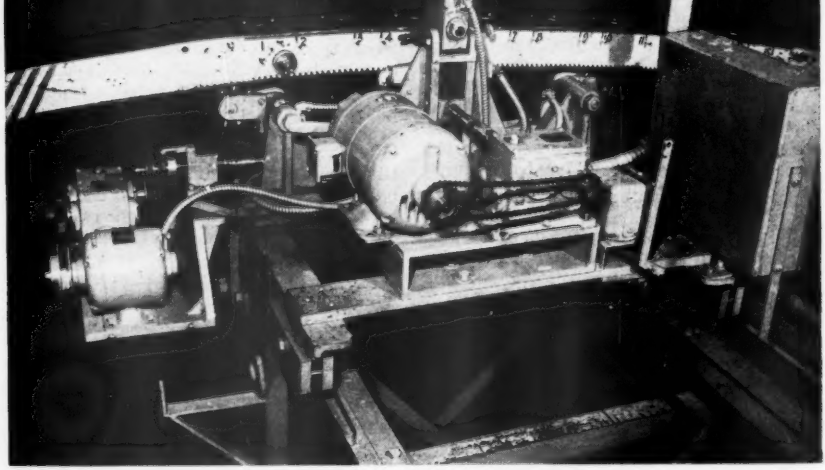


Fig. 2. Close up view of Temco remote control lateral-shifting installation on Lockheed designed Drivematic table. Tension motor and reduction gear box are at far left; lateral drive motor and reduction gear are at center, and electrical panel housing micro-switches and relays is at far right.

in machine down time.

The lateral shifting mechanism was developed by C. H. Rowan, Dallas, a Temco maintenance electrician, as a means to increase still further the output obtainable with the tables designed by Lockheed. The Lockheed tables had provisions for remote-control longitudinal shifting along a given row of rivets, but they left all lateral shifting as a manual operation. As a result, at the completion of each line of rivets, the operator had to go first to one end of the table and then to the other loosening clamps, shifting the panel with a bell crank, and retightening the clamps he had loosened. This operation was both time consuming and fatiguing.

With the new Temco installation, this manual shifting is eliminated completely, and it is possible for the operator to position the panel anywhere along either axis without leaving his chair. Not only has this saved time shifting between rows formerly riveted with the Drivematic, but in addition it permits the operator to compensate and hold close tolerances in cases where a stringer is not absolutely true.

The Temco installation is mounted directly on the Lockheed table, and involves only minor modification of the table itself, the principal changes being in the carriage where motors and solenoid clamps replace hand cranks and mechanical clamps.

There are five basic elements in the installation. These are the lateral shifting mechanism which replaces the hand crank, the tension mechanism which releases tension on the contour bars to which the panels are bolted prior to shifting and restores tension after the shift is completed, a solenoid clamp to maintain tension on the indexing bar except during lateral shifts, the actual control mechanism, and a group of electrical and mechanical safety provisions which make it virtually impossible to damage table, carriage, or panel through operator error.

Total cost of the first lateral shifting installation ran slightly over $1,800 including materials, labor and purchased parts, but it is estimated that the cost of converting the second Drivmatic, which will be undertaken as soon as parts now on order are delivered, will be well under that figure. All machined parts for the installation, including tension supports, solenoid clamps, motor mounts, actuators and mounts for switches were fabricated and installed by the Temco tooling department, while the maintenance department built the control cable track and installed the electrical components and wiring.

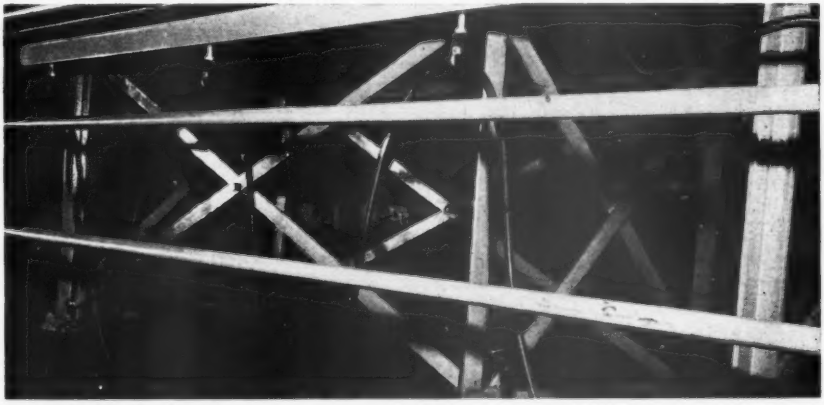


Fig. 3. The control cable for the remote control lateral shift installation is suspended by roller type carriers from a trolley track mounted to a guard rail parallel to the rear of the table.

. . . Cold Forming, from page 75

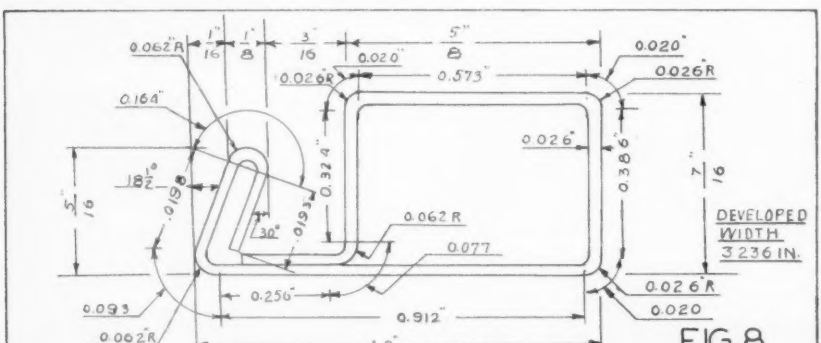
the stainless steels which may cause scoring of its surfaces; this difficulty being minimized by the use of a lubricant either applied to the entrance of the material into the roll sets or at the roll set itself where lubrication is realized during actual forming. Except for simple sections or sections with easy curves, stainless steel strip to be formed by this method should be limited to stock thicknesses of 0.080 inches.

The design of a series of rolls may be quite difficult, especially where a complicated section is to be formed. In many instances, the manufacturers of roll forming equipment is given the responsibility in producing rolls of the correct design and workmanship. The first step in laying out a series of rolls is a rough layout indicating the approximate shape to be given in each successive roll pass; this being used as a basis to calculate the exact angles, curves and other dimensions which information is for the guidance in producing the rolls. The first step in the layout is to determine the pitch line of the roll passes; this is usually a line passing horizontally through the lower half of the finished shape. The vertical center line is then established, passing vertically through the pitch line. This pitch line acts as a guide in establishing the roll diameters while the vertical center line determines the position of the rolls horizontally on the spindles.

Illustrated in Figure 8 is a drawing of a finished section from which the flat width is determined; all of the calculations are made from a neutral axis, and factors such as the amount of material to form the angles and bends, and the increase in the width of the strip due to roll pressures is considered. In this instance, cold roll forming of the finished section illustrated in Figure 8 is made in nine roll passes, the shape of the form after each pass being illustrated in Figure 9. A developed roll set for the fourth pass is illustrated in Figure 10 where all dimensions for the complete machining of the rolls are given. Note that both the top and bottom roles are made into three segments.

The material from which these roll sets are made is determined by both the material to be formed, the complexity of the shape and the expected production of the specific item. Thus rolls that are made from machine steel and not hardened will produce anywhere from a few thousand up to 50,000 feet of formed stock. However, where substantial production requirements are demanded, or where hot rolled material is to be formed with the scale giving difficulty due to its abrading action, an alloy tool steel, either air or oil hardening, is employed. Exceptional life will be realized when hardened to approximately Rockwell C60 to C63. Rolls are

(Continued on page 82)

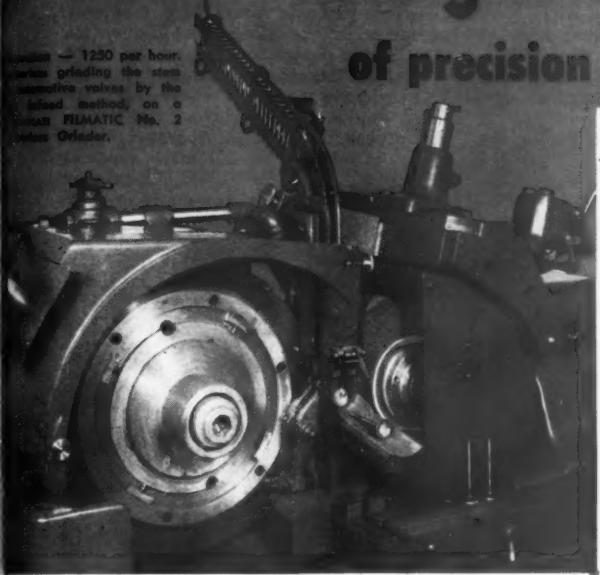


Courtesy: The Yoder Co., Cleveland, Ohio

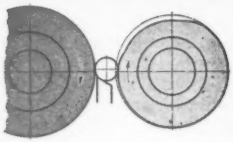
Fig. 8. The first step in designing a series of form rolls is to lay out the finished section and calculate the flat width of its profile.

Idea for High Production

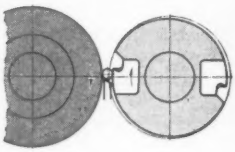
of precision ground parts



— 1250 per hour. ...ous grinding the stem ...omotive valves by the ...infeed method, on a ...NATI FILMATIC No. 2 ...otless Grinder.



Cammed regulating wheel. Work is loaded and ejected at low section of wheel. Production per minute = rpm of regulating wheel.



Double cammed regulating wheel, notched for loading and ejecting the work. Production per minute = 2 x rpm of regulating wheel.

Have you considered automatic centerless grinding for your precision ground parts? The equipment illustrated here, developed by Cincinnati, shows what can be done. A CINCINNATI FILMATIC No. 2 Centerless Grinder is equipped with an automatic loading device and a cammed regulating wheel. This method of precision grinding (diagramed at the right) offers several advantages... very low cost... high rate of production... excellent finish... accurate sizing... elimination of slideway wear. ¶ For today's defense work... for future applications when the pressure on machine tools eases a bit... the cammed infeed method of centerless grinding is worth serious consideration by cost-conscious engineers in high production plants.

FILMATIC

CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. Complete specifications may be obtained by writing for catalog No. G-591.

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO

CINCINNATI

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

. . . **Milling Fixtures, from page 61**
produce large or medium quantities of work at a low unit cost. One of the simplest types of fixtures which can economically be used, because of low initial cost, is shown in Figure 1. A **block fixture** of the type shown in the foreground is loaded while parts are being milled in a second block in the holding device. The loading time, as far as machines are concerned, is only that time required to remove one block from the vise and to insert and clamp another. The blocks must be located in a specific position in relation to the cutters. This can be done by using stop pins for locating the work transversely, or the vertical position can be controlled by steps in the jaws or by the use of standard parallels. To have all pieces milled to the same size, the blocks must be exact duplicates in their essential dimensions.

These block fixtures are well adapted for holding cylindrical pieces, and they can often be used for second operations on screw machine parts where it is necessary to do additional milling or slotting operations. They are often used where it is necessary to mill two slots at right angles. This can be easily accomplished by placing the work in a square.

Where the quantity of parts to be milled is large enough to absorb a heavier initial equipment cost, more elaborate holding devices or fixtures can be used; but, their initial cost must be kept down or not allowed to exceed the point at which the unit cost of the proposed product increases. Thus, quantity of parts becomes the chief factor in determining the type of fixture equipment.

Frequently it is desirable to change the vertical position of the workpiece in relation to its longitudinal travel. This can generally be done advantageously by using a simple **bridge type fixture** as shown in Figure 2. The base of the fixture is clamped to the table; the bridge is pivoted in the base; and, as the bridge feeds along with the table, the bridge roller, following a fixed cam path, raises the bridge and work to the desired position. The regular table cycle of rapid approach, feed, and rapid traverse return is employed.

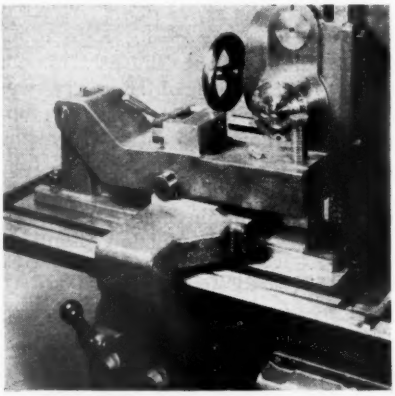
Figure 3 shows a bridge type fixture producing bridge reamers. Here, the tapered section of the bridge reamer is produced by elevating the bridge, and the straight section by allowing the bridge to drop to the normal operating position. This bridge fixture is controlled by two cams, one on either side, because of the size of the fixture. Incorporated in the bridge member is an automatic indexing fixture; the power for indexing is applied by means of a torque motor. In order to get extreme accuracy of index in this type of fixture, simply apply individual index plates on each of the four work spindles. The torque motor holds the locking pin in position on each side of the locking disc which eliminates errors due to backlash or play in the gears which connect the various spindles.

In an effort to reduce loading time and also to eliminate burrs, such an operation is performed by the climb milling method which permits using a solid tail-stock. To reduce the loading time, the workpieces can be placed in cradles and a slight pressure on the individual ball knobs is sufficient to retract the headstock centers. As the thrust of the cut is against the solid tailstock, it is not necessary to use any additional locking devices and light spring pressure is sufficient to hold these parts in position.

Figure 4 shows a **roll-over type fixture** which is rather widely used in making

(Continued on page 104)

Fig. 2. The workpiece being machined in this bridge fixture is a fuse part, in which the floor of the slot being cut has a contour. Spindle speed is 2000 rpm, and the feed rate is 20 ipm.



U-Bolts or Centered Eyes

rapidly duplicated with

di-acro HYDRA-POWER BENDER

At last—a PRODUCTION BENDER that "Bends them ALL"—tubing—angle—channel—extrusions—moulding—strip stock—bus bars—and of course—all types of solid materials. U-Bolts and Eye Bolts are just two examples of the shapes that can be rapidly produced in one operation with this hydraulic power bender.

An example of large radius forming.

The DI-ACRO HYDRA-POWER BENDER can be easily set up in your own plant for a great variety of forming operations or it can be delivered completely tooled for speedy production of a specialized part. Investigate this universal machine before you buy any "single purpose" bender.

Send for 40-page "Die-Less Duplicating" Catalog

giving full information on all DI-ACRO Benders, Brakes, Shears, Rod Parters, Notchers, Punches—also our offer of free DI-ACRO Engineering Service.

DI-ACRO is pronounced "DIE-ACK-RO"

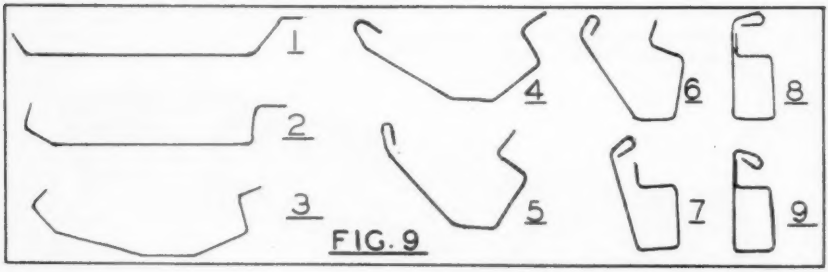
DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN MFG. CO.

315 8th Avenue, Lake City, Minnesota

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Cold Forming, from page 78



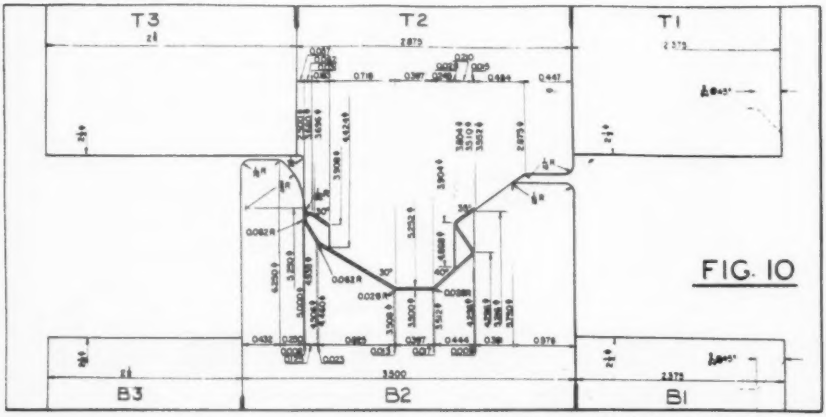
Courtesy: The Yoder Co., Cleveland, Ohio

Fig. 9. A total of nine roll passes is required to form the section as indicated in Figure 8. The shape of the strip as it leaves each successive roll pass is illustrated.

made in sections so that a selection of material can be made in accordance to the expected service requirements for various parts of the roll. Thus, within a roll, one part may employ a tool steel that has toughness whereas another part of the roll is made from a tool steel that has exceptional abrasion resistance. This split roll design also makes it possible to replace worn parts at maximum economy and speed. Along with this idea, the use of inserts can also prove advantageous.

The extreme flexibility of the press brake allows unusual freedom in design; the tooling is generally simple and relatively inexpensive, and with a few standard dies a wide variety of components can be made. Where the parts are suited to the press brake, economical production is possible, even though the quantities may be high. The output is, of course, determined by the size of the parts and the handling required, but where parts are fairly small the output in some cases may average up to 400 to 500 units per hour.

(Continued on page 154)



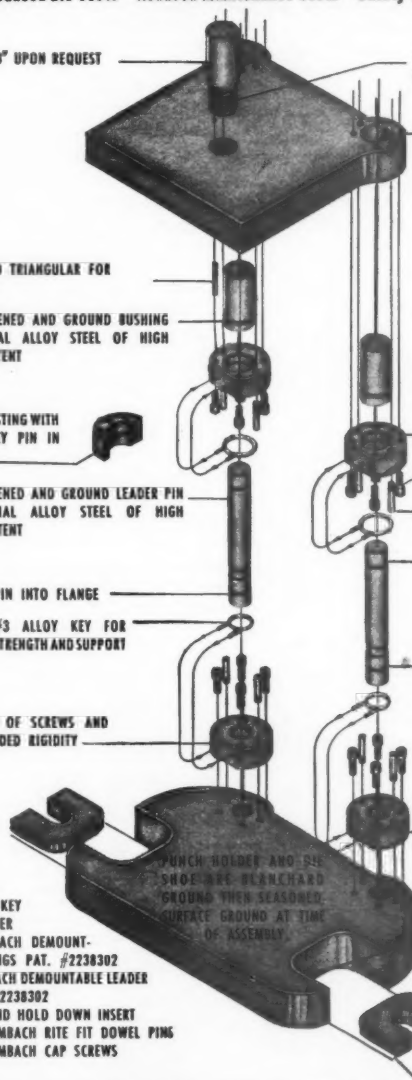
Courtesy: The Yoder Co., Cleveland, Ohio

Fig. 10. After the preliminary lay-out the shape of the section and the shape of the rolls for each pass are determined. The fourth roll pass for forming the shape under discussion is illustrated.

E. A. BAUMBACH MFG. CO.

1812 SO. KILBOURN, CHICAGO 23, ILL.

Advantages of Baumbach Demountable Pins and Bushings in Standard Precision Die Sets
Accuracy and Alignment
Flexability Reduced Die Costs—Reduced Maintenance Costs—Safety and Hold Down Insert


SHANK—¾ TO 3" UPON REQUEST
1¼–12 STANDARD THREAD LARGER UPON REQUEST
CLEARANCE HOLE FOR BUSHING
KEY-TAPERED AND TRIANGULAR FOR LOCKING SHANK
BAUMBACH HARDENED AND GROUND BUSHING MADE OF SPECIAL ALLOY STEEL OF HIGH MANGANESE CONTENT
MILD STEEL FLANGE WITH MOUNTING FACE PRECISION GROUND AT RIGHT ANGLES TO INSIDE DIAMETER OF BUSHING
ENTRY FOR DIE CASTING WITH APEX #3 TO KEY PIN IN POSITION
BAUMBACH CAP SCREW
BAUMBACH RITE FIT DOWEL PIN
BAUMBACH HARDENED AND GROUND LEADER PIN MADE OF SPECIAL ALLOY STEEL OF HIGH MANGANESE CONTENT
OIL GROOVE
.006 PRESS FIT PIN INTO FLANGE
SPECIAL APEX #3 ALLOY KEY FOR MAXIMUM SHEAR STRENGTH AND SUPPORT
KEY GROOVE
NOTE LOCATION OF SCREWS AND DOWELS FOR ADDED RIGIDITY
MOUNTING FACE PRECISION GROUND AT RIGHT ANGLES TO OUTSIDE DIAMETER OF PIN
PUNCH HOLDER AND DIE SHOE ARE BLANCHARD GROUND THEN SEASONED SURFACE GROUND AT TIME OF ASSEMBLY
CLEARANCE HOLE FOR PIN
BAUMBACH DESIGN GIVES ADDED WORKING AREA AND STRENGTH
HOLD DOWN INSERT
WELD CHANNEL

SET ASSEMBLY CONSISTS OF

1—SHANK AND KEY
1—PUNCH HOLDER
1—PAIR BAUMBACH DEMOUNTABLE BUSHINGS PAT. #2238302
1—PAIR BAUMBACH DEMOUNTABLE LEADER PINS PAT. #2238302
1—DIE SHOE AND HOLD DOWN INSERT
1—SET OF BAUMBACH RITE FIT DOWEL PINS
1—SET OF BAUMBACH CAP SCREWS

WRITE FOR FULL DETAILS OF BAUMBACH'S AUTOMATIC ALIGNMENT WITH PAT'D. DEMOUNTABLE LEADER PINS, BUSHINGS

DIE SET, LAYOUT SHEETS AND CATALOGS FURNISHED UPON REQUEST

. . . Broaching, from page 69

The next step was to complete the layout of each unit in terms of sound engineering principles, keeping in mind the large forces developed. Since this is a key machine in line production, its down time represents large losses so the design was carefully reviewed for safety and ease of maintenance and service.

The machine, Figure 1, consists of the following units:

(1) The bed.
(2) Reciprocating ram to carry the cutting tools past the work.
(3) Driving mechanism for reciprocating the ram.
(4) Work holding fixture.
(5) Transfer mechanism and rollover.
(6) Frame and support for the elements.
(7) Tools.
(8) Operating power plant.

The All Steel Bed

The bed supports all of the elements and must handle all of the reactive forces. It is of all welded construction approximately 6 feet wide, 7 feet high and 36 feet long. The complete structure is reinforced to form uniform compartments using steel plates and box sections. The total weight of the bed units is approximately 50,000 lbs., and is thoroughly stress relieved.

The great rigidity of this large structure and its resistance to bowing and separating are important features of the high cutting ability of this machine. The bed supports the ram ways. These ways shown in Figure 2 are constructed of 6½" x 9" rectangular hollow high grade cast iron sections, hardened and surface ground to within .0002" on the thickness dimensions. They are bolted to planed surfaces producing a perfectly aligned way. The uniform hollow sections reduces warpage to a minimum in heat treatment.

Reciprocating Ram

The reciprocating ram shown in Figure 3 carries the cutting tools and is of modified box construction. It consists of 3" plate 43" wide, 24 feet long and three 2" x 12" members run full length of the ram. The complete unit weighs 12,000 lbs., and is stress relieved.

The driving rack is fastened to the back of the ram and travels at a maximum speed of 200 ft./minute for a stroke of 18 feet. This unit has more than 5000 square inches of bearing surface to support the high cutting loads. The high grade cast iron ways are planed in position.

Driving Mechanism for the Ram

The ram is driven by an adjustable speed D. C. motor directly coupled to a worm and wheel through a rack and pinion. This unit is capable of handling peak loads of 450 H. P. through the

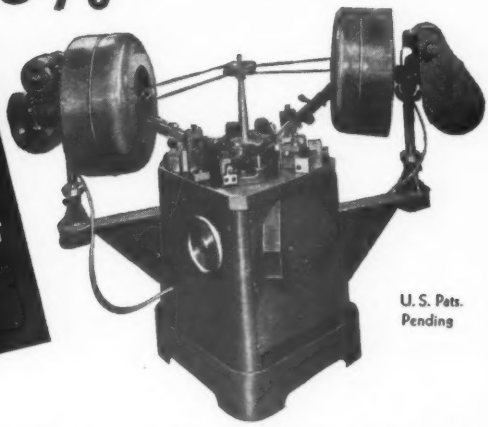
(Continued on page 90)

Fig. 4. Diagonally below the push button panel is the right hand work holding fixture in loading position. Above the fixture and behind the push button panel can be seen a few of the broach teeth. Immediately to the left of the right hand fixture is the rollover. Next to the left of the rollover is the left hand work holding fixture in cutting position. Each cutting cycle of this machine removes approximately 7 lbs. of stock from a typical V-8 engine head. The machine's speed is such that one operator can keep two men busy loading and unloading.

WORLD'S FASTEST!

SAVE 65% OF YOUR THREAD ROLLING COSTS

WITH THE *Prutton* Model 125 Rollmaster THREAD ROLLING MACHINE



U. S. Pats. Pending

★ **300% Faster Thread Rolling**—Your *Prutton* averages 18,000 to 20,000 pcs. per hr. net production. Includes set-up, adjustments, etc. Class 3 fit.

★ **4 to 7 Times Longer Die Life**—4 million to 7 million pcs. per set of *Prutton* dies. (Performance reported from actual service by users.)

★ **⅓ Less Floor Space**—Your *Prutton* replaces 3 reciprocating thread rollers. Eliminates your investment and upkeep on 2 extra machines.

★ **65% Saving in Manhours**—One *Prutton* operator replaces 3 on conventional machines. Frees 2 operators for service elsewhere.

★ ***Prutton* Dies from Stock**—Large selection in standard widths and thread forms available.

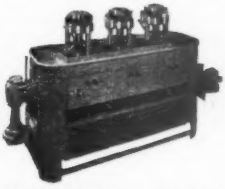
Greatest Thread Rolling Advance of the century! Outperforms others three to one! Threading parts need no longer be a bottleneck. One *Prutton* Model 125 Rollmasters will thread the entire output of two high-speed headers. One operator, running 4 *Pruttons*, will produce up to 600,000 pcs. daily. Threads bolts, fetter ring and spiral nails, also does many knurling, marking, serrating, necking and contour operations. Your *Prutton* actually pays for itself *faster! Prutton* Model 125 for #4 to ¼" dia. x 2" thread length. *Prutton* Model 200 for diameters to ½" x 3" thread length.

SEE NEW BULLETIN 101

Latest reports from users—new applications, new performance records. Specifications, detailed, illustrated. Write today!

Prutton Rollmaster Mod. 200

Prutton Tapmaster Mod. 30



D. H. Prutton MACHINERY CO.
5295 WEST 130TH STREET
CLEVELAND 11, OHIO

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

New Roller Saves Time, Offers Bending Versatility

A new, hand-operated slip roll which forms complete circles in 16 gauge steel in less than ⅓ the time it ordinarily takes and also forms bends at any point in a sheet of material has been recently developed.

Designated Di-Acro Roller, an exclusive feature of the machine is a cam actuated idler roll. Because of it, complete circles of one inch diameter or larger can be formed in two passes through the rolls—something that usually takes several passes.

In "two pass circle forming", the cam operating lever lowers the idler roll to allow insertion of the material. It also raises the roll to a pre-set position which determines the diameter of the circle to be formed. On the first pass through the roller a half circle is formed, and on the second pass the circle is completed. In addition, parts can be duplicated with great accuracy and at a high rate of production since the idler roll always returns to its pre-set position.

Circles of one inch diameter only can be formed in just one pass through the roller by making slightly different adjustments.

Bends can also be located in any position along a sheet of material being formed in the Di-Acro roller because the material can be fed through the rolls without bending until the cam lever is engaged. As a result a wide variety of shapes—with straight sections on both sides of the bend—can be produced.

Round, flat and square stock as well as many other ductile materials can be formed with this precision machine. Maximum material forming capacity of the roller is ¼" round steel bar and ¼" tubing . . . or their equivalents. Special rolls will be used for special bending jobs.

Di-Acro roller is built in two sizes. The No. 1 roller forms material up to 6 inches in width and the No. 2 roller forms material up to 12 inches in width. Both machines will form material to a one inch diameter or larger.

Forming a complete circle in two passes through the Di-Acro roller is demonstrated here. After adjusting the roller for material thickness and circle diameter, operator inserts material from front of roller turning the crank in a clockwise direction until approximately half the material has been run through the roller. While still cranking, the operator pulls cam operating lever into position and formed, Figure I. Material is then reinserted in roller with its position reversed —cam lever is still engaged—and the rolling procedure is repeated, Figure II. Result—a perfectly formed circle in two passes through the roller, Figure III.

To form bends located at any point along a sheet of material being formed with Di-Acro roller, Figure IV, operator merely pulls cam lever into operating position. This raises the idler roll and helps to form bend. Releasing the cam lever allows a straight or flat section of material to pass through the rolls.

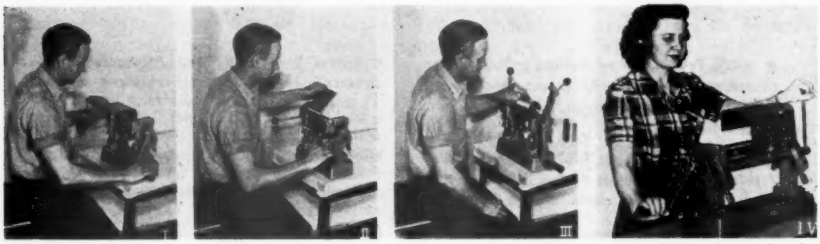
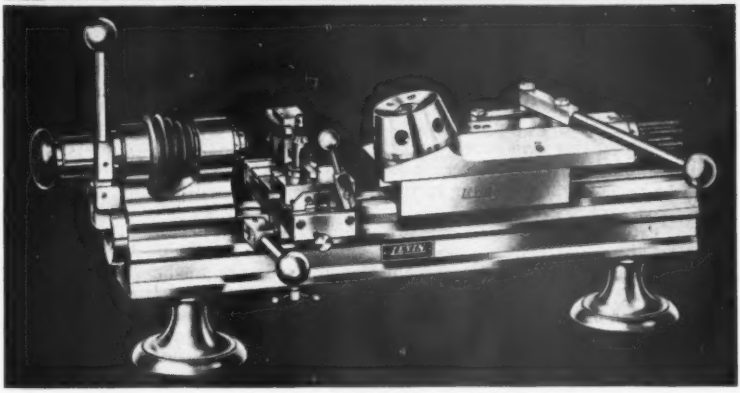


Photo Courtesy O'Neil-Irwin Mfg. Co.

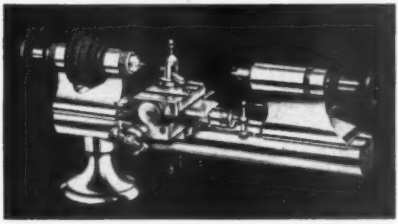
LEVIN® INTRODUCES A JEWELER'S TYPE

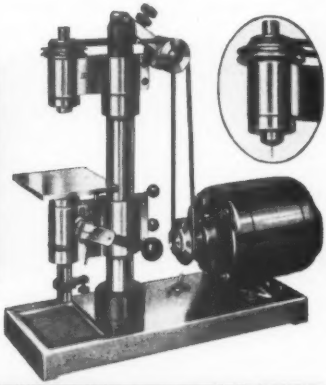
BENCH TURRET LATHE



A small sensitive turret lathe for instrument parts and second operation work. Swing 4", bed 18", collet capacity 3/16" or 5/16"; self indexing, 6 position turret with 1/2" holes and hardened slide ways.

Write for catalog listing turret lathes, turret tools and other models of lathes.





Micro-drill press for small hole drilling. Sensitive spindle holds small drills in TRUE collets ...Immediate Delivery!

LOUIS LEVIN & SON INC., 782 E. PICO BLVD., LOS ANGELES

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Pressed Metal Institute, from page 67

"As far as we are concerned, a soap solution, sprayed on the blank, is all that is being needed at this time for lubricating the part being made.

"The smallest tonnage unit available today is 370 tons."

Question: "Can this be used in mechanical presses, and what is the length of run before you have to replace rubber? Thinking in short-run terms, what would be the quantity of stampings that you could run before replacing the rubber?"

Answer: "The package units, which I think you are referring to, sir, should be installed in a hydraulic press. The rubber consideration, again, is a function of the kind of part we are making, the frequency, the kind of operation we are going through. The only part of the rubber that has to be replaced is the outer layer. There are many layers involved.

"As far as actual figures are concerned, I hesitate to even venture an average figure, because it would vary so much with the kind of part we were making. We speak in terms of nicks and scratches. If you have a smoothly contoured part, you are not going to get nicks and scratches. On the other hand, if you have a sharp type of article being manufactured, the reverse is true, so that you couldn't arrive at a practical medium that could serve as an average figure. It would be in a neighborhood of thousands of cycles."

Question: "You have said nothing about redrawing. Does your method eliminate the need for redraws on most jobs, or would you calculate the operation in the usual manner that you would with ordinary tooling?"

Answer: "No. You wouldn't. The usual procedure—I think I am sticking my neck out on this statement—is for single draw. There are some cases though, of course, where more than one draw is necessary."

Question: "Can you use your tools for the second draw?"

Answer: "Absolutely. In fact the same tool, just hinging on that same subject, may be used for making two parts, one longer than the other, which is possibly analogous to a double draw. The same tool definitely can be used for the second draw, depending on the part."

Question: "What is the limit of depth you can go?"

Answer: "There really isn't any theoretical limit to that. I think it would be best for us to think in terms of depth ratios, 1½ : 1 would be good. We are supplying presses today that will draw as deep as 12 inches, but again the actual limits to the depth of draw are no big problems to us."

Question: "What about the finish? In other words, how does it affect the part itself?"

Answer: "That is a good question. We are very proud of the ease with which good finishes can be had. The finishes are of the quality obtainable from the finest steel dies, and the reason for that is easily seen. The outer surface of the part is in contact with rubber. The inner surface is in contact with a male punch. The problem then becomes one of maintaining the surface condition of the male punch. The punch, by the way, I might mention, depending on the production lot, is made of Masonite, Kirksite, or possibly steel."

Question: "Is there anywhere in Chicago or nearby where we can see this process?"

Answer: "The Martin Press, in Chicago."

Hydroform

Mr. Martin was the next speaker. He took up the discussion of the Hydroform press and process.

"We make a press that is especially designed for this process, as opposed to the package unit idea. We entertained the package idea also, and we may some day go to it.

"First of all, I would like to dwell a little bit on the process. I think we ought to start with that. We use, instead of solid rubber, a laminated rubber container, filled with hydraulic oil, making it a rubber diaphragm application. That is putting it very simply, but describes the structure of the upper unit.

"The processes compare roughly in operation. The details of actual tooling of the machine do vary or differ. In our case, we make the male punch also. We make a lower draw ring. We move the punch into the blank and also into

(Continued on page 94)

"SPEED ALLOY STEEL PLATE WELL SUITED FOR CAMS"

—That's the opinion of Lodge & Shipley Co., Cincinnati, Ohio, who are successfully using Speed Alloy hot rolled alloy steel plate for the cam plate of the cam-operated rear cross slide on their famous "2A Duomatic" Lathe. They state:

"Speed Alloy was selected for the cam plate because it is particularly suited for cams. A considerable saving in machining time has been found over other suitable steels. Definite figures are unavailable, but the savings are probably in the order of 10%. The cam slot is carburized and heat treated to 50-55 Rockwell C. This surface hardness is readily attainable, with good core hardness to back up the case. Reduced distortion of Speed Alloy is very desirable in this part . . . distortion from heat treating has been no problem."

Speed Alloy has cut costs for many producers of molds and zinc die casting dies and on a variety of machine parts. Maybe it's the answer to your problem. Check with your Speed Steels Distributor.

DISTRIBUTED BY

Brown-Wales Co., Boston-Hartford-Lewiston, Me. ■ Bridgeport Steel Co., Bridgeport, Conn. Beals, McCarthy & Rogers, Buffalo, N. Y. ■ Burger Iron Co., Akron, Ohio ■ Grammer, Dempsey & Hudson, Inc., Newark, N. J. ■ Earle M. Jorgensen Co., Los Angeles-Houston-Oakland-Dallas ■ Passaic County Steel Service, Inc., Paterson, N. J. ■ Peckover's Ltd., Halifax-Montreal-Toronto-Winnipeg-Vancouver ■ Peninsular Steel Co., Detroit, Mich. Pidgeon-Thomas Iron Co., Memphis, Tenn. ■ Horace T. Potts Co., Philadelphia-Baltimore

Produced by W. J. Holliday & Co., Inc., Speed Steel Plate Division, Hammond, Indiana. Plants: Hammond and Indianapolis, Indiana

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Broaching, from page 84

20 to 1 worm reduction gearing having a vertical axis output pinion engaging the ram rack.

The driving worm having a diameter of 13", drives a 49" worm wheel, mounted on a shaft 10-¾" maximum diameter at center. Tapered roller bearings having outside diameters of 16-½" carry the thrust while three roller bearings support on each side of the taper mounted 15" face pinion and at the outer end of the worm wheel.

The entire unit is constructed so as to permit the pinion, cartridge mounted supporting bearings and taper mounted worm wheel to be assembled as a sub-unit and lowered vertically by crane into the heavily ribbed cast main housing. Likewise the entire worm unit including housing and bearings are assembled as an individual component and swing horizontally by crane into meshing position with the worm wheel. The entire drive unit is then lowered into working position in the frame. A tapered eccentric ring located at the lower end of the unit housing is jacked up to positively lock the driving unit in the aligned position.

Worm and wheel lubrication is accomplished by a multiple of pressure jets directing streams of oil to the proper contact areas. Surplus oil is drained back to tank and pump unit for filtering and re-circulation.

This unit is designed so it can be used for vertical or horizontal applications.

The Work Holding Fixture

Figure 4 shows the right hand work holding fixture in loading position and the left hand fixture in cutting position.

Because of the large amount of metal removed per minute, the forces to be absorbed by the fixture are of much greater magnitude than the forces encountered in other fixture designs. Approximately seven pounds of stock is removed from a typical V-8 engine head, each cycle.

The fixture must be massive to hold the part firmly and to obtain the necessary rigidity and freedom from vibration.

The major forces exerted by the cutting tool are in two directions, one parallel to the direction of the ram movement, and the other at 90° from this.

As shown in Figure 4, the locating and supporting pads are massive to handle the required stresses set up by the broaching forces, and are located as close to the cutting surface as practicable.

The part is mechanically clamped by spring loaded irreversible plungers with locking angles and it is unclamped by hydraulic cylinders.

When the fixture is indexed into position, the lock bar is lowered over the clamping pads to tie the fixture into the upper machine structure, thereby resisting the separating forces as shown in the left hand fixture, Figure 4.

The forces parallel to the ram movement are taken by the fixed stops located in the machine frame. The fixture is cammed into position and moved against these stops by heavy springs.

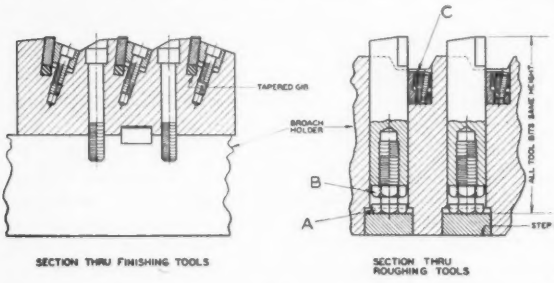


Fig. 5. The tungsten carbide inserts must be strong enough to withstand extremely high cutting forces and adequately spaced to insure rapid chip disposal. Details "A", "B" and "C" show method of adjusting, locking and clamping the inserts. Based on the amount of stock to be removed and the length and width of the workpieces, the desired "chip per tooth" is attained by the individually ground stop bars.

Workpiece Transfer Mechanism and Rollover

The transfer mechanism, built in two sections, is hydraulically operated and its arms have fingers with radial motion to locate the part. The next movement is parallel to the ram in a right to left

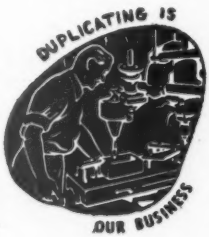
(Continued on page 98)

Let us help you

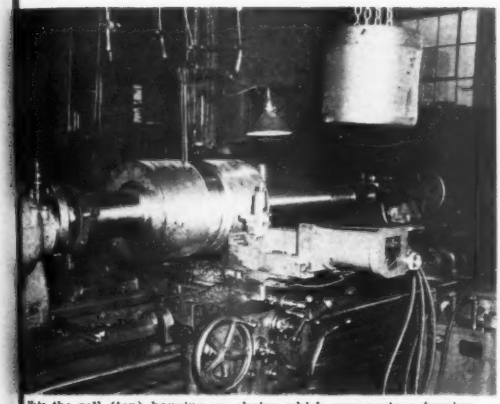
INCREASE PRODUCTION 4 to 5 TIMES

by

TRACER CONTROLLED MACHINING

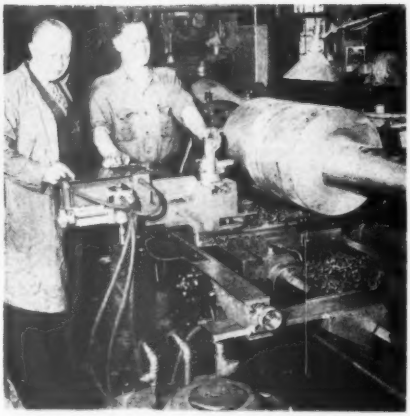


Ordinarily, by adding 30% to the original cost of your lathe to have it factory-equipped with a WALKER UNIVERSAL STEP TURNING DUPLICATOR, you can increase its productivity 4 to 5 times. This is not just theory, but actual fact based on comparative tests.



Note the roll (top) hanging on chains which represents a turning job formerly requiring six hours to complete by ordinary methods. This same job is now being turned at the rate of 3 rolls in 8 hours.

These illustrations show a 32" Boye & Emmes Lathe equipped with the WALKER UNIVERSAL STEP TURNING DUPLICATOR.



Note templet profile which is being duplicated on workpiece.

MODERNIZE YOUR OLD LATHE

Regardless of age, if your old lathe has good bearings and sufficient power, you can convert it into one of the most valuable machines in your shop by equipping it with a WALKER UNIVERSAL STEP TURNING DUPLICATOR. Due to simplicity in design you will find the cost about half of what you would expect to pay for a duplicator. No relays — no air valves—no electronic tubes. Just a simple hydraulic power unit, cylinder and tracer.

We have arrangements with most lathe manufacturers whereby your new lathe will be delivered with the WALKER UNIVERSAL STEP TURNING DUPLICATOR as standard equipment if you will specify same when ordering.

In addition to building duplicators for all sizes of boring mills, milling machines, lathes, planers, shapers, grinders and special purpose machines Walker builds duplicators for small machines such as high speed heads.

Send sketch of parts and name of machine for immediate information.

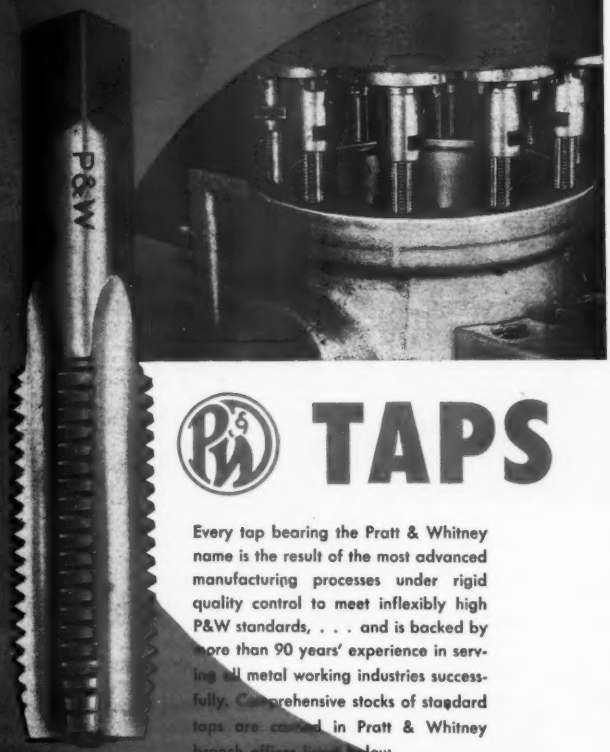
REPRESENTATIVES IN PRINCIPAL AREAS

Walker HYDRAULIC DUPLICATOR CO.

P. O. Box 451 STANDISH, MICHIGAN

Pioneer Designers and Builders of Precision Duplicating Equipment

PRECISION WORK
CALLS FOR
PRATT & WHITNEY



P&W TAPS

Every tap bearing the Pratt & Whitney name is the result of the most advanced manufacturing processes under rigid quality control to meet inflexibly high P&W standards, . . . and is backed by more than 90 years' experience in serving all metal working industries successfully. Comprehensive stocks of standard taps are carried in Pratt & Whitney branch offices listed below.

PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice for Accuracy

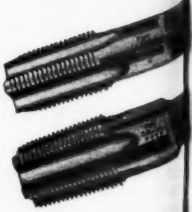
BRANCH OFFICES AND STOCK ... BIRMINGHAM* ... BOSTON ... CHICAGO
CINCINNATI ... CLEVELAND ... DALLAS (The Stone Co.) ... DETROIT ... LOS ANGELES
HOUSTON (The Stone Co.) ... NEW YORK ... PHILADELPHIA ... PITTSBURGH
ROCHESTER ... SAN FRANCISCO ... ST. LOUIS ... EXPORT DEPT. WEST HARTFORD

CUTTING TOOLS • GAGES • MACHINE TOOLS

STANDARD HAND ... MACHINE SCREW TA...
For general use on a ... variety of machines.

SPIRAL POINTED HAND ... MACHINE SCREW TAPS
Free cutting without ... on soft, stringy material.

THREE-FLUTED HAND TA...
Provide additional ... disposal for soft materi... for horizontal or deep ...



STRAIGHT and TAPER PI...
Straight: NPS, NPSF, NPS...
Taper: NPT, ANPT, ...

TAPPER TAP NIBS and ...
For automatic nut ... equipment.

PRESS-RITE

OPEN BACK — INCLINABLE

POWER PRESSES

For

BLANKING
PUNCHING
DRAWING
FORMING
STAMPING

IN WAR OR PEACE . . .

Press-Rite Power Presses will help you beat production deadlines! That's because Press-Rites embody the advanced engineering principles and up-to-date operating features which give you more day-in, day-out production . . . per machine . . . per operator . . . per dollar invested.

Check these outstanding advantages:

- **Press-Rite Airflex Clutch-Brake System (Optional on all presses 20-ton capacity and over)**
- **Triple Ramway Lubrication**
- **Roller Bearing Flywheel**
- **Non-Repeat Single-Stroke Mechanism**
- **Uni-Cast Frame**
- **Extra Heavy Construction**
  . . . *and many others!*

Beat competition to the punch! Plan now to modernize your operations with Press-Rite Power Presses. Write today for New Press-Rite Bulletin P-552!

Nos. 60 and 85 Also Available in Back-Geared Types.

Sales Service Machine Tool Co. SSMT

PRESS RITE PRESSES • SHAPE RITE SHAPERS • KELLER POWER HACK SAWS

2363 UNIVERSITY AVENUE • ST. PAUL 4, MINNESOTA

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Pressed Metal Institute, from page 88

the rubber, which has access to the female die.

"The range of work that we have worked out has been about .002 aluminum foil in some special work up to as high as ½ inch steel. I believe we could go higher. However, we don't find many customers who have draw work normally beyond ⅜ in. steel or, of course, the equivalent in aluminum.

"The principal advantage is the saving in tools, and in our exhibit you will see some comparisons made to standard draw work. All of these parts have been made on what we call a small Hydroform unit. It has about 12-inch maximum capacity and is installed in a shop similar to a milling machine or grinder. It mounts flush on the floor and doesn't require special installation.

"As far as tonnage goes, we like to stay away from the term tonnage because it is quite misleading. However, the question has been asked quite frequently, "just how many tons is the machine designed for?" It is an 875-ton machine. That is a matter of arithmetic, however. It is simply the pressure applied in square inches or p.s.i., to the square inch of tool area available. In our case we have about 12-inch diameter circle, 113 square inches, multiplied by 7½ tons per square inch, which roughly approximates the tonnage, plus a little extra that we have to engineer into the press.

"The machine is designed similar to the manner in which a forging press would be designed, except that the upper ram does no work. It simply lifts this oil chamber or cavity up and down, so as to get the work in and out. When the ram comes down, the position is locked, so it, of course, will retain the pressure that is required to form the part.

"The process from the tonnage standpoint, frankly, is quite wasteful. There is a lot of area in some draws, so that in the center, particularly, the material is subject to the same pressure as is required to hold a flange job. That is the answer, as far as tonnage is concerned.

"Many of those parts you see on the table could be done on a 25-ton or 50-ton press with conventional tools. However, by this process, with your applying much higher pressures to rubber and to oil than you would normally, or perhaps have had experience with, you just have to have the press rugged enough to do the job.

"We have a number of these presses installed. I heard someone ask where they might see one. The closest one to this area would be at Lear, at Grand Rapids, or our own company in Cincinnati. We maintain two sizes of presses for the purpose of demonstration, making samples. Another spot would be in Marion, Indiana. We also have them on the East Coast and on the West Coast and in the Midwest, Wichita, Kansas. I don't know where all of you gentlemen are from, but that will give you some idea."

Questions and Answers

Question: "Are there any of those shops that you mentioned contract shops?"

Answer: "Yes. You may be interested to know that there are two owners of small Hydroforms who are doing job work. We are quite interested in that, incidentally, from the economic standpoint. To me, as a shop man, the practical proof for a new device of this kind is its ability to support the little fellow who has to make a living from it. It is quite easy to sell the equipment to large companies whose costs are low, but you fellows who have to make a dollar count, it is quite important that the machine have an economic advantage.

"There are two small companies using it, and I would be glad to give you their names."

Question: "I am interested in finding out from Mr. Martin and Mr. Nierenberg what the total number of machines is that are in operation in the country now, just roughly. Do you, for instance, Mr. Martin, have ten machines or 100 or 200, that are sold?"

Answer: "We have roughly about 14 machines out. We have been in business about three years, actually. The Cincinnati Milling Machine Company bought this from a little company in Baltimore, called Hydroform. We haven't advertised. You haven't seen anything published, except a few articles published by some of our users or customers. We plan to start some publicity in the next sixty days. We have been going very slowly, frankly,

(Continued on page 162)

RELENTLESS PRODUCTION SCHEDULES
and
SMALL PRECISION GEARS

•

FEELING FUTILE?

Unusual conditions are usual now. You are *expected* to build small, precision mechanisms on fast production schedules. And you will be expected to produce them better and faster tomorrow. But why worry? All you will need will be better machines.

MORALE BOOSTER

And better machines are here *now!* The Hamilton No. I Precision Small Gear Hobber will *solve* your problem in respect to gears. All gears, regardless of shape, if they are small and exact, can be produced faster on the Hamilton No. I.

FREE HELP

You don't expect full information about such a machine in the small space of one advertisement. But full information is available . . . ten printed pages of it . . . and offered to you free. Write for our Bulletin No. H-492, with supplement. Do it now . . . tomorrow you may need to *know!*

THE *Hamilton* TOOL COMPANY
832 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Swedish Craftsmanship!

Sajo Vertical Milling Attachment

The Sajo "Plain" Milling Machine

the SAJO "UNIVERSAL" MILLING MACHINE

exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ **Standard Equipment includes:**
3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, 1" arbor, arbor support brace.

★ **Extra Equipment:**
Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDENSED SPECIFICATIONS

Table Size	41⅛" x 9½"
Longitudinal travel: Plain Miller	24½"
Universal Miller	27½"
Transverse travel	8¼"
Vertical travel	19"
12 spindle speeds	36-1340 RPM
Table feeds	12
Taper in spindle	No. 40 NMT
Main motor	3 HP

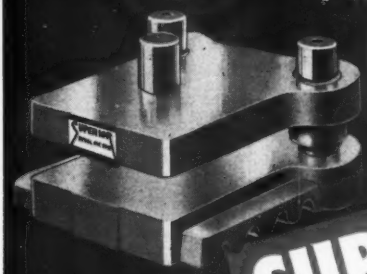
Precision anti-friction bearings on spindle and gear shafts
One-piece column and base
Net weight—2200 lbs.

Write for Catalog

NO PRIORITY—— PROMPT DELIVERY——ATTRACTIVE PRICE

AUSTIN INDUSTRIAL CORP. 76-X MAMARONECK AVE. WHITE PLAINS, N. Y.
DEALERS IN PRINCIPAL CITIES

HERE'S WHY YOU CAN **Meet** URGENT DELIVERY SCHEDULES **Cut** DIE MAKING **Costs** WITH



SUPERIOR PRECISION ALL-STEEL **DIE SETS**

Yes, you can reduce die making costs! And complete work faster on urgently needed dies when you use Superior All-Steel Die Sets.

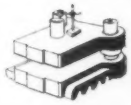
You can speed die production by using Superior die sets and relying upon Superior engineers to help determine your needs. Write, wire or phone now for helpful information —AND

FREE CATALOG—*descriptive of Superior Precision All-Steel Die Sets and Supplies will be sent without obligation. Please state name of company and your title.*

FOR FAST LOCAL SERVICE CALL THESE SUPERIOR REPRESENTATIVES

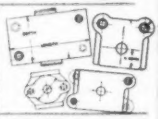
- **Kalamazoo, Mich.** — Phone 7988
- **Indianapolis, Ind.** — BRoadway 5668
- **Chicago, Ill.** — CEntral 6-3869
- **Dallas, Tex.** — Riverside 5138
- **Syracuse, N. Y.** — 2013 James St.
- **Rockford, Ill.** — Phone 33991
- **St. Louis, Mo.** — Lucas 1223
- **Milwaukee** — Mitchell 5-6027
- **Dayton, Ohio** — Hemlock 6209

1 **Precision workmanship** throughout — no time lost in modifying or altering sets to fit your needs.

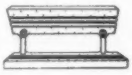


2 **Superior sets are easier to handle** — exclusive safety flange provides quick, safe gripping surface.

3 **Wide range of die set sizes** in standard and special models —extends die maker's ability to produce high quality dies faster and better.



4 **Pre-machining on punch and die holders available**—have Superior machine deep cavities, cut slots and drill holes prior to final grinding and jig boring. This service at moderate additional cost will relieve your facilities and cut overall die making time.



5 **Plus** — welded bosses around pins or bushings for maximum accuracy and extended life — shank location optional — reduced punch holder size where possible — and Superior's ability and experience in producing precision die set for the stamping industry.

SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS.

. . . Broaching, from page 90

direction transferring the part from the right hand fixture to the rollover and the new part into the right hand fixture.

In the next stroke the part in the left hand fixture is transferred to the outgoing conveyor and the part from the rollover is transferred to the left hand fixture.

The rollover received the part completed by the right hand fixture, turns it 180° during the fixture index and stores the part until the next cycle. Since the machine cuts in both directions, the tools are in two different levels; therefore the work in being turned must be deposited at a higher level.

Fixture and Rollover Frame

The fixture frame supports and ties into the bed, the fixtures, rollover, transfer, etc.

The frame is of welded construction consisting of four 3" and one 2" vertical members, horizontally tied together with welded one inch members. The completed unit weighs approximately 15,000 lbs., and is stress relieved. It is bolted to the main structure through 1-½" plates.

The Broaching Tools

Tungsten carbide inserts are used in most tools for these machines. These tools, or bits, must be strong enough to withstand the cutting force and spaced to allow the chips to be freely carried away.

Figure 5 shows how each bit is held so it can be adjusted and replaced in a very short time. The tools are held in a broach holder made of sections approximately 40" long bolted to the ram and located by a key.

When sharpened, the height of each tooth is set to a gage by turning adjusting screw "A" and adjustment locked by nut "B". The tooth is then locked in position by clamp "C".

The outstanding feature of these tools is their uniformity. Gang type fixtures can be made to accommodate all bits of any given size. They can be purchased and stocked in smaller quantity, thus reducing cost of maintenance and storage expense.

Chip progression, or "chip per tooth", is built into the holder by means of a step bar, ground to the proper height and used as a backing to resist cut pressure. Amount of step or graduation is determined by the amount of stock to be removed, and the length and width of work pieces.

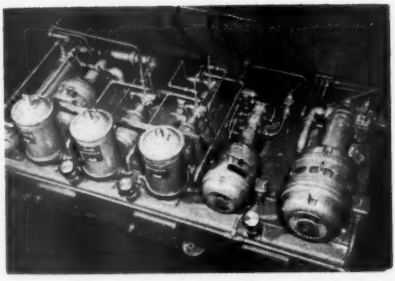


Fig. 6. Here is the central source for hydraulic power and lubrication. The motors, pumps and related equipment are mounted on the tank.

The stock removal per tooth on the roughing operation is usually .015" to get under the scale, reducing to .005 to .008" in the completion of the roughing operation. The finishing tools are full width tungsten carbide blades as shown in the right hand of Figure 1 and set to remove .002" per blade at the start and .001" at completion. Each of these tools is independently adjusted by a tapered gib as shown in Figure 5. The tools are always in view of the operator so that broken tools can be spotted and easily replaced

The chips fall from the tools and away from the fixture into channels. Wipers attached to the ram push the chips to convenient discharge points.

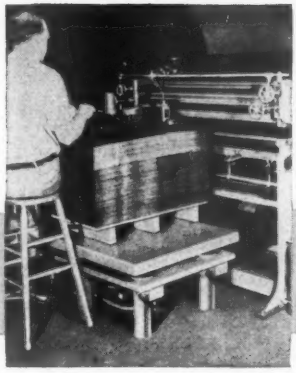
Operating Power Plant

Hydraulic power and lubrication are supplied from a central source, shown in Figure 6. Mounted on the tank are the motors, pumps, and related equipment to supply lubricating oil to rams, ways worms and wheel.

This unit also supplies hydraulic oil for raising and lowering the fixture, for clamping the work and for the transfer and rollover operation.

The original hydraulic driven machine using 5 motors was later changed to use eight 30 H. P. motors driving the hydraulic pumps. The result was a machine capable of a speed of 60 ft. per minute.

(Continued on page 102)



Previous to installation of the automatic, self-leveling **Portelvator Packlifter,** the sheet feeding operation shown here was performed from a standard four-wheel floor truck. This involved stooping and lifting, and resulted in unused machine capacity. Application of **Portelvator** Material Positioning Equipment increased daily production to such extent that installations were made at 6 additional locations.

YOUR PROSPECT FOR COST REDUCTION IS

Excellent

Time after time after time, the application of **Portelvator** to material positioning at the machine has resulted in such savings that problems, which seemed to have only a remote relationship to the operation, have vanished. If you have one machining operation where mechanical material positioning can be applied, your prospect for cost reduction is excellent.

Write for information about the easiest way to replace brawn, your most expensive component. Ask for our free Bulletin No. P-503.

PORTELVATOR ®

Portelvator is the registered name for the Handy Hamilton Portable Elevating Table. Standard models have lift capacities of 1,000 — 2,000 or 5,000 pounds, and lift travels to 58" above floor level. Lift is transmitted through worm, worm gear, and screw. Lift principle removes all possibility of tipping, slipping or settling under the load. Modified designs, with various power applications and controls, are used throughout industry for lifting and leveling safely and "as planned".

THE Hamilton TOOL COMPANY

832 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

Increase output...reduce costs!

Costly, time-consuming trimming and notching operations can be done in one operation with a Brehm Trimming Die. Don't worry about stock thickness. Edges will be of full thickness—clean, flat, without burrs or distortion at the trimmed edge.

Other Brehm Die advantages! **Workable Materials**—gold, silver, stainless or mild steel, copper, brass, zinc, aluminum, fiber, rubber, plastics, or what did you have in mind? **Quantities vary**—stove or refrigerator doors, auto bumper buffers or typewriter covers, from 264 to 900 per hour. Intermediate parts, where stock and scrap can be blown from the die, about 1200 per hour. **Shapes**—fountain-pen ferrules, artillery cases, watch cases, burial vaults, automotive, kitchen, radio and television accessories and parts. Almost anything *you* need trimmed.

A Brehm "Shimmy" Trimming Die with angular cams, cuts four ways in one press stroke, handling straight or curved edge contours, with multiple notches and projections. Slow, costly "horn" and "pinch" trimming operations, are eliminated.

Write today . . for your free copy of the Brehm Die Catalog. If you wish, submit blueprints or parts for full information or quotation.

Brehm® TRIMMING DIES — THE "SHIMMY" REG. DIE

THE STEEL PRODUCTS ENGINEERING CO.

BREHM DIE DIV., DEPT. K, SPRINGFIELD, OHIO

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

Now Outstanding British Machine Tools

BLANKING PUNCHES

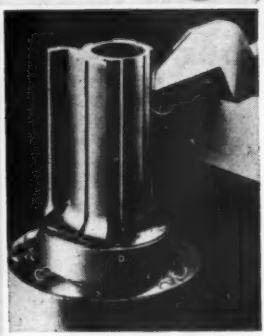
MADE IN ONE SET-UP with the ESSEX PUNCH SHAPER

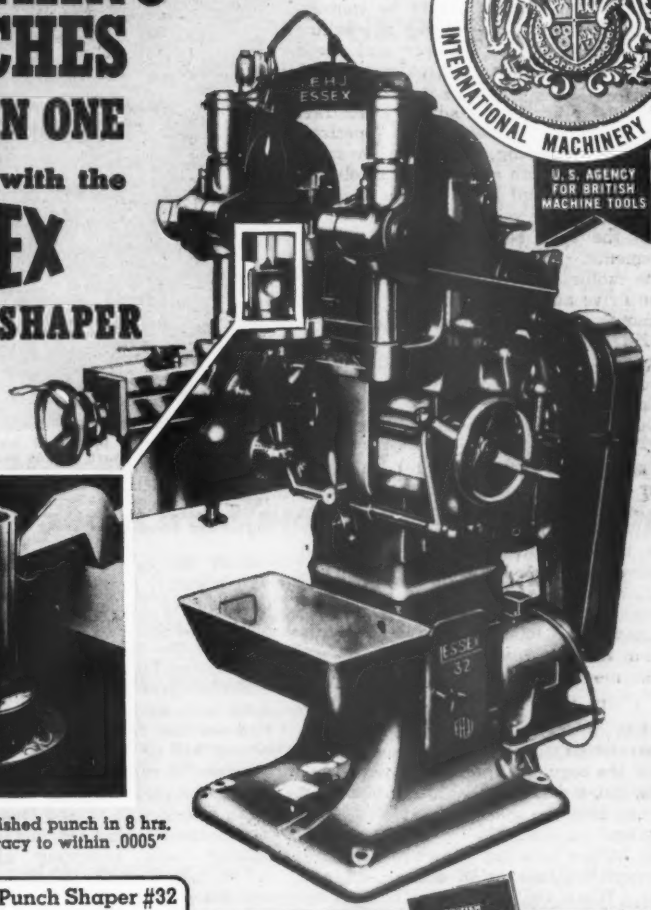
ENDORSED

BRITISH INDUSTRIES CORP.

INTERNATIONAL MACHINERY DIVISION

U. S. AGENCY FOR BRITISH MACHINE TOOLS





From layout to finished punch in 8 hrs. maintaining accuracy to within .0005"

ESSEX Punch Shaper #32

Essex machine tools are renowned for high precision standards, top grade materials and meticulous attention to the smallest production details. Complete parts stocks are available in the U. S. through British Industries Corp.

	Essex 32
Maximum Stroke	4¼"
No. of Speeds	3
Cycles per Minute	36-65
Table Size—Dia.	8½"
Motor Horsepower	1
New Weight—Lbs.	1800

DELIVERY: 30 Days or Less

MAIL THIS COUPON

for complimentary book, "British Machine Tools"

Valuable 48 page catalogue describing and illustrating hundreds of outstanding machine tools.

BRITISH INDUSTRIES CORP. Dept. TP-8
164 Duane Street, New York 13, N. Y.
Gentlemen: Please send "British Machine Tools" to

Name.....
Company.....
Position.....
Street.....
City.....State.....

British Industries Corporation 164 Duane St., N.Y.13, N.Y.

. . . Broaching, from page 98

This proved that it would be impractical to use such a drive for a machine which would have the power and speed which on cast iron is approximately 250 ft./minute.

The drive selected had to have fast acceleration and deceleration, repetitive accuracy of stopping, possibility for speed adjustment, smooth acceleration to eliminate shock load and high pull-out torque.

The adjustable voltage drive was selected as the type best fulfilling these requirements.

The motor is directly connected to the worm drive and its power supply is from a remotely mounted generator driven by a 300 H. P. T.E.F.C., B.B., AC. motor. The drive handles peak loads of 600 H.P., without appreciable change in speed. It accelerates to full speed in 1-½ to 2 revolutions and decelerates in the same time.

A solid loop connection is used between motor and generator. The complete control of the motor is through 7 relays operating in the motor and generator fields, thus permitting fast operation and selective optimum speed in either direction.

Speed data was taken by oscillograms, and power at various positions of cut with a recording meter directly rotated by the movement of the ram.

Designed Safe Operation

Safety was given the highest priority in this design. It is hardly necessary to review the sequence interlocking arrangements, but a few of the different safetys designed into the machine may prove interesting.

The fixture locating pads are designed to permit the passage of a fixed amount of air. When the orifices are blocked by the part being properly located the pressure increases, operating a pressure switch which permits the next function. This system has eliminated all of the troubles due to dirt, sticking plungers, etc., and locates the casting within .002".

An ammeter at the operator's station constantly indicates the cutting load. When this load increases beyond normal, it is an indication to the operator that the stock is heavy, the material is hard or the tools are dull. Should the load exceed the capacity of the drive or a wreck occur, authorized personnel, after determining the conditions, will operate a jog button which is normally locked, to move the ram at very low speed and momentary high torque.

Fig. 7. Complete individual unit operation is provided through push button control. The ammeter gives a constant reading of the cutting lead. The middle button in the next to bottom row is a jog or inching control. This button is key-locked and can be actuated only by authorized personnel.

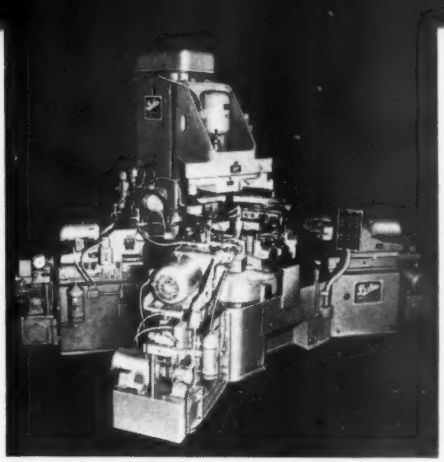
Stopping of the ram is through heavy duty limit switches operated by dogs carried on the ram. Should the electrical circuit fail or the dogs move, the rack is designed to run off of the pinion. To dissipate the inertia of the ram a soft steel plate is bolted to it and located to travel past cutting tools fixed in the bed. These cutting tools removing approximately ⅛" of metal readily dissipate the energy and bring the ram to a stop. When the cause has been remedied, the ram is easily brought back into mesh with the pinion.

How the Machine Operates

Complete individual unit operation is provided through push button control shown in Figure 7. An automatic cycle is as follows:

(A) Right hand fixture down, work unclamped, work moves from right hand fixture to rollover and at the same time

(Continued on page 110)



What are the travel and automobile agencies reporting every season? . . . That Joe Doakes—the typical American—is taking more vacation and traveling farther year after year . . . And here's one of the reasons why—this Buhr Five-Way Horizontal-and-Vertical Hydraulic-Feed Drilling Machine . . . the Machine which one of the world's leading Auto Makers uses "around the clock" for producing Rocker Arms in such volume and at such low cost that . . . Joe Doakes may afford to drive thousands of miles for vacations —literally from Banff in west Canada to Tallahassee, Fla.

WHY DOAKES GETS FROM BANFF TO TALLAHASSEE

For Details About Buhr

A comprehensive Catalog . . . or a personal call from a Buhr Sales Engineer . . . is yours for the asking wherever you are located in the United States! . . . For every problem involving this type of Special Machinery—including the type which helps Joe Doakes get from Banff to Tallahassee—phone, wire or write us.

BUHR MACHINE TOOL CO.
Ann Arbor, Michigan
Phone: Ann Arbor 2-5646—5980
Detroit WOodward 3-2126

Auto Maker Chooses This to Turn Out 880 Pieces an Hour for Utmost Economy

As each new model comes off the auto assembly lines, the battle to cut production costs becomes more intense. Not long ago, one of the big auto companies concentrated on how to make a certain rocker arm most economically.

Here Was Their Problem

To secure a piece of production equipment which would perform 7 operations on the rocker arm, including tapping, drilling, endmilling, chamfering and spotfacing—that was the problem.

As the company to design and manufacture the Special Machinery to solve this problem, they chose Buhr.

What the Machine Does

In general—it drills 8 holes, drills through 4 more holes, taps 4 holes, endmills 4 places, spotfaces 4 places and chamfers 4 previously drilled holes. It is equipped with 42" automatic Index Table and six-station Holding Fixture, loading four parts per station. Parts are automatically clamped while fixture moves from loading position into first working station, and are automatically unclamped while Fixture moves from last working station to unloading.

Specifically, the Machine does this—

Station 1—Load and Unload

Station 2—Vertical, idles; Horizontal, taps and drills (4) 7/16-20 holes

Station 3—Vertical, endmills (4) 1/2" Radius places; Horizontal, chamfers (4) previously drilled holes

Station 4—Vertical, drills (4) 1/8" dia. holes 5/16" deep; Horizontal, idles

Station 5—Vertical, drills (4) 3/32" dia. holes through; Horizontal, spotfaces (4) 15/16" dia. places

Station 6—Vertical, idles; Horizontal, taps (4) 7/16-20" S.A.E. holes

PRODUCTION—880 pieces per hour at 100% efficiency.

Why Buhr Was Called In

Leading Automobile Manufacturers have done business with Buhr for more than a quarter-century. . . . They know Buhr's record for dependable Special Machinery . . . and for delivering on time. . . . They're familiar also with Buhr's excellent manufacturing facilities . . . and their experienced, trustworthy and specialized sales and engineering staffs. Consequently . . . for Special Machinery like this . . . it is second-nature for them to call Buhr.

Buhr ***SPECIAL MACHINERY . . .***

Leaders Make Sure with BUHR

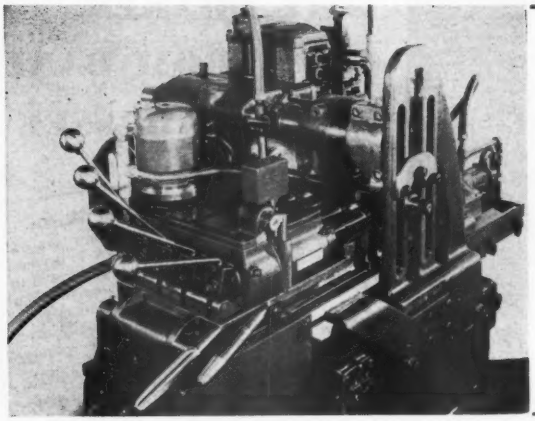


Fig. 3. Bridge reamers held in the bridge type fixture shown are automatically indexed. Climb milling, with thrust of cut against a solid tailstock, permits fast loading method.

. . . Milling Fixtures, from page 80

cuts on the periphery of the workpiece. This type of fixture is driven by means of a rack which is mounted in the fixture base. As the table and fixture advance to the right, the forward movement of the upper part of the fixture is stopped by means of an adjustable stop block. However, as the table and base of the fixture continue to the right, the movement of the rack in the base of the fixture rotates the upper section of the fixture. It is first necessary to feed to depth before starting the rotary motion to complete the part on the periphery. In this instance an extra loading block is used so that four workpieces can be loaded while the cut is taken. Again the loading time is reduced to that time required to unclamp the loading block and to substitute a fully loaded block of new parts.

(Continued on page 112)

Fig. 4. The roll-over type of fixture allows cuts to be made on the periphery of the workpiece.

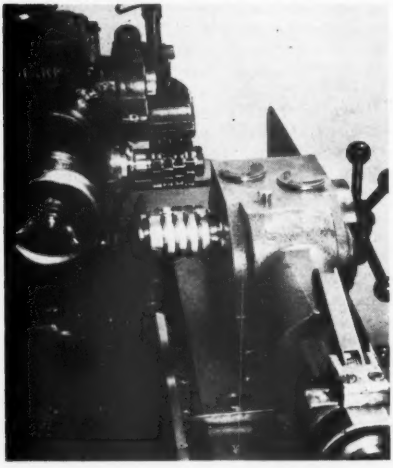
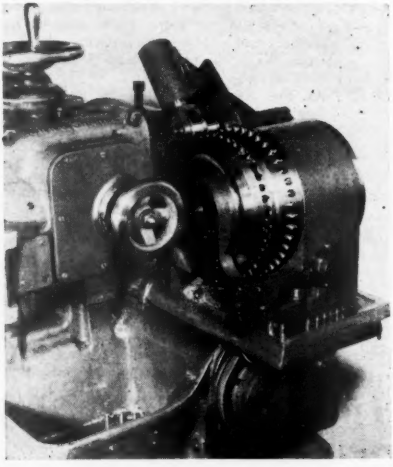


Fig. 5. Drum type fixture with automatic clamping and unclamping permits operator to devote full time to loading workpieces.



New • Fast • Proven

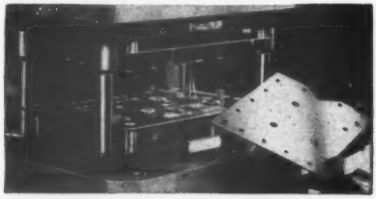
LOW COST methods for PERFORATING and NOTCHING SHEET METALS

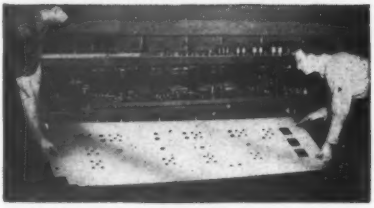
Whistler *MAGNETIC* Dies at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.

Whistler *ADJUSTABLE* Dies on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

REDUCE DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION**—*Down time is minutes as compared to hours for change-over.* For precision work in all types and sizes of presses. **START PRODUCTION AT ONCE.** Pierce materials up to ¼" thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.





● Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

NAME

FIRM

ADDRESS

CITY ZONE STATE

S. B. WHISTLER & SONS, Inc.

Adjustable, Magnetic, Custom and Cam Dies for all Industry

748 Military Road, Buffalo 23, N. Y.

For your convenience **Whistler direct factory representatives are located in most principal cities. Their on-the-job application experience, combined with Whistler's 35 years experience in the manufacture of tools and dies, is available on request.**

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Lee-Rowan switches to 3M Belts for higher polish on metal hangers

PRODUCTION PROBLEM: Reduce finishing costs . . . produce a higher polish on product. Manufacturer was using costly, troublesome set-up wheels. Finish was unsatisfactory.

3M RECOMMENDATION: Switch to 3M Abrasive Belts and a swift 3-step operation: one pass on a No. 180 Belt, one pass on a No. 240 Belt and a final pass on a greased No. 240 Belt using a Buff Contact Wheel.

THE RESULTS: This speeded-up finishing method is currently producing a highly polished hanger—with greatly reduced abrasive costs. Process is easier and safer for operator.

Let a 3M Methods Engineer analyze your abrasive requirements and recommend how you can cut costs, step up production through the use of 3M abrasives.

Minnesota Mining & Mfg. Co.
Dept. TP-852, St. Paul 6, Minn.

Please send me free booklet
STEP UP PRODUCTION

Name_____

Company_____

Address_____

City_____ Zone____ State_____

3M® ABRASIVE BELTS

Made in U.S.A. by
MINNESOTA MINING & MFG. CO.
General Offices: Saint Paul 6, Minn.
In Canada: London, Ont., Can.
Export: 122 E. 42nd St., New York City

Makers of: "SCOTCH"® Pressure-Sensitive Tapes • "SCOTCH"® Sound Recording Tape
"3M"® Adhesives • "UNDERSEAL"® Rubberized Coating
"SCOTCHLITE"® Reflective Sheeting • "SAFETY-WALK"® Non-Slip Surfacing

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

"DESEGATIZED" HI CARBON — HI CHROMIUM *die steels are the BEST*

Compare the actual photographs (above) of random-cut hardened polished and etched samples—"DESEGATIZED" Steel on the left; the average standard process steel on the right. Note the full uniformity of the "DESEGATIZED" steel—no harmful carbide concentrations are present!

This means that when you specify "DESEGATIZED" Hi Carbon—Hi Chromium Die steels, you get

- ease of die machining
- minimum heat treating hazard
- extra toughness
- superior die performance

Production economy demands the best die performance! Select the best steel for your next die job—one of the "DESEGATIZED" Hi Carbon Hi Chromium die steels!

See the difference with your naked eye—take advantage of another Latrobe service—Inspection Discs cut from the bars making up your mill order for "DESEGATIZED" High Carbon-High Chromium Die Steels.

SEND FOR THIS BOOKLET TODAY!

LATROBE STEEL CO.
Latrobe, Pa.

Yes! I am interested in your Metallurgical Inspection Disc Service. Send booklet at once.

NAME .....
POSITION .....
COMPANY .....
STREET .....
CITY ..... ZONE ..... STATE .....

TP1

LATROBE STEEL CO.

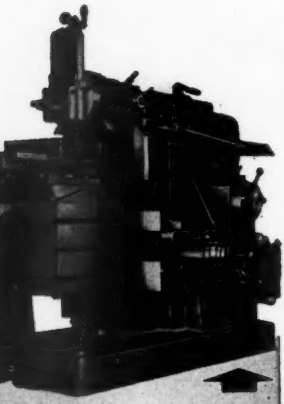
Formerly LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

...h Offices and Warehouses: BOSTON, BUFFALO, CHICAGO, ...VELAND, DAYTON, DETROIT, HARTFORD, LOS ANGELES, ...WAUKEE, NEW YORK, PHILADELPHIA, PITTSBURGH, ...LOUIS, TOLEDO.

...e Agents: DALLAS, DENVER, HOUSTON, MINNEAPOLIS, ...LAKE CITY, SEATTLE, WICHITA.

"TODAY...IT'S PRODUCTION THAT COUNTS"

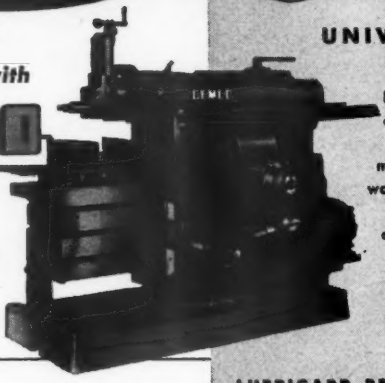


... BEAT COSTLY OBSOLESCENCE with

GEMCO

PRECISION SHAPERS

SAVE TIME...
SAVE LABOR...



UNIVERSAL TYPE

For tool and die work and general machine shop work requiring frequent changes and angular settings. Available in sizes from 16" to 36" stroke.

LUBRIGARD PROTECTED

PRODUCTION TYPE

For general machine shop use and heavy production work. Available in sizes from 16" to 36" stroke.

LUBRIGARD PROTECTED

• PLAIN TYPE SHAPERS
...available only in sizes 16" and 20" stroke

WRITE FOR BULLETIN

GEMCO
SHAPER Company
4417 OLEATHA AVE.
ST. LOUIS 14, MO.
PRECISION MACHINERY SINCE 1917

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

ALLEN ⬡ SCREW . . . SOCKET SCREW

mean the same thing everywhere!

Although *Allen ⬡ Screw* is not in the dictionary, engineers and production men the world over say *Allen ⬡ Screws* to refer to *precision socket screws.* That's how it is with names — probably there's a name that comes to your mind at once as an outstanding *Industrial Distributor* in your locality. He is almost certain to be the one who handles *Allen ⬡ Screw* products. His experience and extensive stock of Allen ⬡ products are the ideal combination to smooth out any problems you encounter in precision fastenings.

THE **BUY** WORD IN SOCKET SCREWS IS **ALLEN**

. . . Broaching, from page 102

a new part is moved from conveyor into the right hand fixture by the transfer bar.

(B) Operator shifts lever on right hand fixture, clamping work.

(C) Operator presses "Preset & Cycle Start" button.

(D) Left hand cradle lock raises.

(E) Right hand fixture swings into cutting position and left hand fixture moves into unloading position.

(F) During down movement, work unclamps in left hand fixture.

(G) Right hand cradle lock swings into locking position

(H) Ram starts cutting to the left.

(J) Left hand transfer moves to left and moves work out of the fixture on to out-going conveyor and the part from the rollover is transferred into the fixture. The transfer returns to starting position.

(K) When ram reaches left end of stroke, it stops, completing one half cycle.

(L) Operator shifts lever on left hand fixture, clamping work.

(M) Operator presses "Preset & Cycle Start" buttons.

(N) Right hand cradle lock raises.

(O) Left hand fixture swings into cutting position and right fixture moves into unload position.

(P) During down movement work unclamps in right hand fixture.

(Q) Left hand cradle lock swings into locking position.

(R) Ram starts cutting to the right.

(S) Unload and load right hand fixture.

(T) At end of stroke, ram stops, completing full cycle.

Should operator complete the loading and clamping of a part and operate the "Preset-Cycle Start" buttons, the circuit holds until the ram stroke is complete and then automatically starts the next cycle.

This cycle is completed in the following time:

Index Right Hand Fixture	.080 Min.
Broach 18 ft. @ an average of 180 ft./min.	.100 Min.
Index Left Hand Fixture	.080 Min.
Broach 18 ft. @ an average of 180 ft./min.	.100 Min.
Total time per cycle	.360 Min.

Conclusion

Our tests show that the cutting time can be further reduced. However, this will not appreciably affect the overall cycle time. How to reduce the material handling time is the problem confronting the engineer.

As we have mentioned several times. extensive use of fabrication was made in this machine. Experience shows that great economies can be realized by this method in small lot production. We usually make use of fabricating methods in highly specialized machines. Occasionally when production quantities reach a certain volume the machine is redesigned for cast-iron applications.

This machine is moderate in weight for its size due to the excellent strength to weight ratio of steel. By close cooperation between Engineering and Weld Shop, we were able to reduce weight by judicious location of ribs and plates to obtain maximum strength and stability.

The machine was built economically because it progressed through production without great difficulties arising from unforeseen complications. The design was so sound that no significant changes were made before manufacturing a large number.

★ ★ ★ ★ ★ ★

Integrated Scheduling For Steel Exposition

Technical sessions of the Association of Iron and Steel Engineers, to be held concurrently with the 1952 Iron and Steel Exposition, will be integrated so that those attending can take full advantage of both the exhibits and technical sessions. These sessions will be held at Cleveland Public Auditorium, September 30 to October 3rd, and will be divided into separate morning and afternoon programs. Discussion subjects will include design, construction, operation, maintenance, lubrication, operating practice, and standardization.

Attendance is expected to total more than 10,000 interested persons, representing all sections of the industry. Tickets will be widely distributed through the industry, and may also be obtained on request from the Association of Iron and Steel Engineers, 1010 Empire Building, Pittsburgh 22. AISE membership is not required for attendance, and there is no registration fee.

All Standard Accessories
Ready to Go Immediately
DETROIT DIE SET CORPORATION immediately on receipt of order ships all standard items in a wide range of sizes . . . dowel pins, die springs, stripper bolts, socket grip head cap screws and other accessories. All are nationally known products manufactured with the same precision as "DETROIT" die sets. For dependable shipment, 'phone, wire or write "DETROIT."
CALL "DETROIT"
DETROIT TR 2-5150
BIRMINGHAM, ALA. 3-1341
BUFFALO PA 9206
CHICAGO PU 5-7694
DAYTON HE 3042
INDIANAPOLIS HU 5604
KANSAS CITY, MO. VI 3558
LOS ANGELES AD 7251
MILWAUKEE GL 3-7170
MINNEAPOLIS PR 1822
MONTREAL, CAN. WI 1186
NASHVILLE 7-0437
NEWARK MA 2-4318
PHILADELPHIA VI 4-4084
PITTSBURGH LO 1-4011
ROCK ISLAND, ILL. R.I. 8-2814
ST. LOUIS FR 6811
ST. PAUL CE 1600
TOLEDO MA 4510
TULSA 3-8193
WICHITA 3-8682
WINDSOR, CAN. 2-1575
DETROIT DIE SET CORPORATION
2895 W. GRAND BLVD. • DETROIT 2, MICH.
DETROIT DIE SET ★

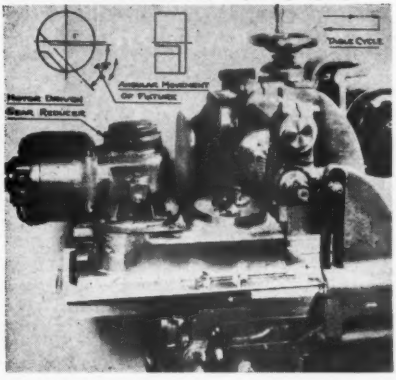
SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Milling Fixtures, from page 104

Figure 5 shows a drum type fixture. Here, the part being machined is a bushing having an eccentric hole in one end while the machining operation consists of putting a slot in the end opposite the eccentric hole. It is to be noted that all of the operator's time is devoted to loading the pieces since they are clamped and unclamped automatically. This type of fixture is well suited to smaller parts that can be clamped very close together, in order to avoid feeding too great a distance between actual cuts. The proper machine and cutter have been selected and maximum cutting efficiency has been obtained. The loading time does not exceed the cutting time and a maximum production rate is realized.

Using an oscillating fixture, such as that shown in Figure 6, it is usually possible to eliminate subsequent cuts. The part shown must have a "pie" shaped piece removed. Normally this would be done by making two saw cuts and then removing the remaining wedge with a small end mill. In many cylindrical or disc members such as impellers, there is a wedge of metal to be removed from between the blades. A standard saw with side teeth is used and the work movement planned so that the cutter can be fed sideways as well as forward.

Fig. 6. An oscillating fixture is used in removing a wedge-shaped section from the brass workpiece. The 34-tooth cutter is 3½" dia., rotating at 670 rpm, or 615 sfpm. Table feed is 5¼" ipm, and the speed of oscillation 230. At these rates, 90 cuts per hour were completed and about 1½ cu. in. of metal removed, requiring ½ hp.

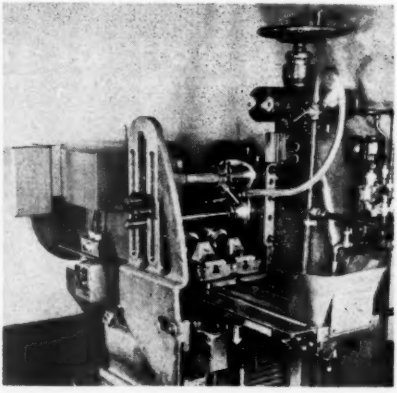


The work and fixture feed forward with the table. At the same time a motor driven crank and connecting rod mechanism in the fixture give the work a steady oscillation. With feed and oscillation the cutter follows a diagonal path and all the "pie" comes off in small chips.

The final example, in Figure 7, illustrates the use of an accurate indexing mechanism mounted on a standard automatic cycle milling machine. The part being produced is a steel cylinder about 3-½" in diameter, having 400 slots, .014" wide, ⅛" deep and 9" long. The cut is taken by the climb milling method in order to keep the saw in tension so that it will maintain a flat form track and a true path, and also to leave the chips in the slots for support when subsequent cuts are to be made. An air cylinder is provided to lift the spindle head so that indexing can be done on the return stroke of the table, and to prevent cutter wear.

Production type machines of present design, with electrical controls, with their complete automatic cycles, fixed table heights, wide ranges of feeds and speeds and dual feed motors, are ideally suited for many fixture applications. By using special fixtures on standard machines, the fixture can be discarded or altered as work conditions change and the standard machine is still available for other classes of work.

Fig. 7. Indexing mechanism is used in making 400 slots in 3½" dia. steel cylinder. Table feed is 9 ipm, with indexing done on the return stroke.



MICROBORE
by DeVlieg

FOR PRECISION WORK

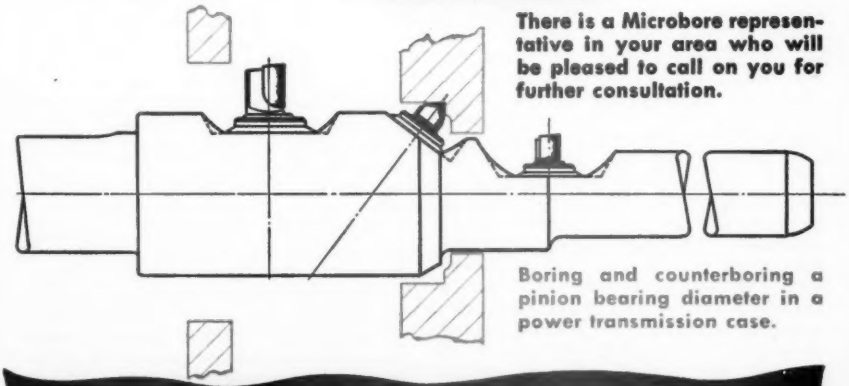
Special Boring Bars

EQUIPPED WITH STANDARD MICROBORE TOOLS

BORING ●
TURNING ●
FACING ■

Each tool independently adjusted by proven micrometer, vernier principle.

There is a Microbore representative in your area who will be pleased to call on you for further consultation.



Boring and counterboring a pinion bearing diameter in a power transmission case.

DeVLIEG MICROBORE COMPANY

480 FAIR AVENUE • FERNDALE 20, MICHIGAN, U. S. A.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Important for Good Grinding: Accurate Centers and Center Holes*

There has been a saying for years that you cannot grind any better than your center holes. This saying was credited to Charles H. Norton, the original designer of the modern cylindrical grinding machine. To this saying should be added that you cannot grind any better than your centers and center holes.

Correct centers and center holes are just as important and just as much a part of the machine as a good grinding wheel, spindle, headstock and footstock.

Faulty centers and center holes are the cause of more spoilage than any other factor, with the exception, of course, of the human element. Complaints of operators that a machine will not hold size are in many cases due to faulty centers or center holes.

by **J. E. Johnson**
Norton Grinding Machine Division
Norton Company

Here are a few observations from actual experience. An operator was finish grinding a large alignment arbor. When reversing the piece in the machine, he noticed a runout of over .002" on diameter previously ground. By the simple processs of lapping the center holes and regrinding both of the centers to the same angle, the expensive aligning arbor was completed without error.

Another example—an operator was unable to duplicate sizes and straightness. Investigation showed that the pieces to be ground were not centered evenly—some center holes were deeper than others. Regrinding centers remedied this situation. The reason for this should be apparent to all operators of cylindrical grinding machines. A footstock center is usually a so-called half center cut back so that small diameters can be ground. This center is always inserted in the footstock with the flat or relief toward wheel. Due to wheel pressure, this center will wear more on the wheel side. The wear may be very slight, not even noticeable. If it is only .0001", it would cause an error of twice that amount in size and straightness if some pieces ground had larger center holes than others. The bearing in the large center hole then would be on the part of center that had not received any wear.

Pieces that have to be reversed end for end will not be concentric unless both centers are ground with the same angle on the point.

In the process of finish grinding of heavy parts such as wheel spindle, these parts often remain in machine for a long period before completion. For this operation it is essential to have correctly lapped center holes and correctly ground centers.

If center holes are lapped as required, 60°+0, and centers are ground as usually specified 60°+0, it would take only a few revolutions of pieces thus mounted in the machine to exhaust all lubrication in center holes and quickly score centers or center holes.

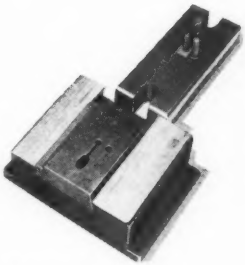
The writer has ground centers for this type of work for over 16 years at a greater angle than 60° (estimated angle) about 60°+11 to 13 minutes. The advantages of this ought to be clear. The bearing in the center holes is heaviest at the largest diameter of the hole, and gradually diminishes toward the point of the center. It not only takes care of a slight error in lapped center holes, but the difference also allows a storage of lubrication and keeps centers lubricated.

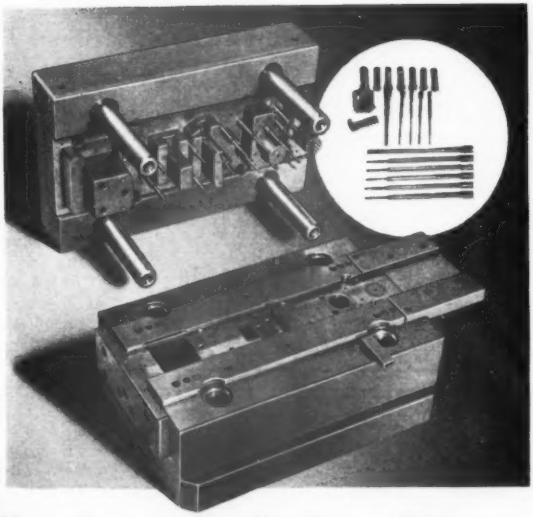
The writer can report that he has not had one serious failure in 16 years due to scoring of centers or center holes.

Headstock centers should be as short as possible to secure concentricity of pieces ground. This is especially noticeable when grinding heavy parts requiring heavy pressure on centers. Although parts will be concentric in the position ground, if the driving dog is placed in another position, a runout will occur if headstock center is too long, and often an out of round condition will also occur.

(Continued on page 190)

*From Norton Company's "Grits and Grinds", Vol. 43, No. 6. Copyright 1952 by Norton Company.





from simple notching . . . to complex rotor-stator jobs . . .

you get more carbide benefits from Carboloy dies

Your blanking, forming, drawing and piercing dies take a terrific beating in day-to-day use. That's why it always pays off to always use Carboloy Cemented Carbide in your dies and punches.

From simple dies costing but a few hundred dollars to complex dies costing many thousands of dollars, applications of Carboloy Cemented Carbides offer greater production, less downtime and maintenance, fewer rejects, longer die life — *all* the benefits that only Carboloy Cemented Carbides and engineering services can give

To enjoy all carbide benefits

You or your die maker may order Carboloy Cemented Carbide made to your specifications in rough-finished form. Final finishing and assembly into your dies is easily accomplished in your own toolroom or by your die maker.

We'll work with you

Carboloy Field Engineers are carbide *specialists*, ready with *on-your-job* answers to trouble-shoot tough die problems . . or to help design new carbide applications for improved performance.

We'll train your personnel

At the Carboloy Training School, your key toolroom personnel will learn latest carbide techniques and applications. Become expert in the finishing and servicing of carbide dies to increase die life, assure top production.

We'll send you technical data

The Carboloy Die Engineering Manual is a handy, all-inclusive guide that shows you how easy it is to design, apply, use and maintain carbide dies. It will save you time. It will save you money. Use the handy coupon below to get your copy.

Why not get the full story on long-wearing Carboloy dies? Call your local Carboloy representative, or use the convenient coupon to get the data you're interested in.

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY
11111 East 8 Mile Ave., Detroit 32, Michigan
Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, New York

Magnet ideas for the shop!

Use Carboloy Permanent Magnet Sheet-Steel Separators to prevent feeding of doubles. And use permanent magnets to give an extra "hand" all around your shop. They're great for magnetic stands, tool-holding devices, sweeper's "pickup" tools, magnetic paper grippers on machines, containers for small parts, and magnetic retrievers. Write for Carboloy Permanent Magnet Stock Catalog, PM-100. (Use coupon →)

CARBOLOY Department of General Electric Company
11111 E. 8 Mile Ave., Detroit 32, Michigan

We are interested in the Carboloy Services checked below:

☐ Die Training School ☐ Die Engineering Manual, D-124 ☐ Have a Carboloy Field Engineer call ☐ Send Carboloy Permanent Magnet Stock Catalog, PM-100

NAME _____

COMPANY _____ POSITION _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Symposium on Extremely Large Forgings and Extrusions to be Sponsored by Four National Technical Societies

With a view to emphasizing to aircraft design engineers the need for the expanded utilization of larger and more complex forged and extruded structural components in forward aircraft designs, a symposium will be held as part of the next annual meeting of the American Society of Mechanical Engineers in December at the Hotel Statler in New York City.

The symposium will present all the principal elements involved in the problems of the creation and the utilization of such new components. These are essential for high speed aircraft which are in turn so necessary for the security of the country and the maintenance of work leadership. In order to cover effectively such a wide field and arrive at a common understanding of this complex problem four national technical societies have consented to cooperate in the organization and presentation of the symposium.

These socities are the American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, the Institute of Aeronautical Sciences and the Society of Automotive Engineers. The entire day, Dec. 2, 1952, will be devoted to the exchange of information and elucidation of the subjects listed on the agenda of the symposium. Eminent authorities in their respective fields will present five important papers during the symposium.

In the morning, J. Carlton Ward, Jr., general chairman of the symposium, will open the proceedings, presenting highlights regarding the development of the joint meeting. George W. Papen, of Lockheed Aircraft Corporation, will present the first paper, "Requirements for Large (Light Metal) Forgings and Extrusions in the Aircraft Industry."

The second paper, "The Design and Construction of Large Forging and Extrusion Presses for Light Metals," will be given by Dr. Morris Stone, United Engineering and Foundry Company, Pittsburgh, Pa.

The final morning paper, to be presented by Thomas L. Fritzlen of the Reynolds Metals Company, is titled

Look to Morton
FOR FIXTURE CLAMPS
AND FIXTURE DETAILS
ACORN NUTS
M-T ACORN NUT CLAMP ASSEMBLY
CLAMP RESTS
WRITE TODAY
AND BE ASSURED OF QUALITY, SERVICE AND FINE WORKMANSHIP
Widest range of types and sizes in the industry . . . Complete Clamp Assemblies or any of their Component Parts . . . Economize by using them as Standards.
For Catalog of our complete line. Includes full size tracing templates of each product. Save looking and designing costs.
MORTON MACHINE WORKS
2421 WOLCOTT STREET • DETROIT 20, MICHIGAN

"Metallurgy and Production of Suitable Light Metal Ingots for Large Forgings and Extrusions".

Following luncheon, George Motherwell, Wyman Gordon Company, Worcester, Mass., will deliver a paper, "The Large Forging Press Operation and its Production Problems."

"The Large Extrusion Press and its Production Problems" is the subject of the fifth paper by T. F. McCormick, Aluminum Company of America.

A committee charged with the planning of the program has been meeting since late last January, arranging the agenda and determining subjects for the discussion. The committee is composed of Robert B. Leo, of The Sperry Corporation, chairman of the Aviation Division of the American Society of Mechanical Engineers; J. Carlton Ward, Jr., industrialist, general chairman of the symposium, and Dr. George Gerard, College of Engineering, New York University, secretary for the symposium.

The technical socity representatives are: for A.S.M.E., O. B. Schier, II; A. I. M. E., Dr. T. A. Read; I.A.S., Robert Dexter; S.A.E., Dr. William O'Donnell. The public relations co-ordinator for the symposium is Ken Ellington, of the Republic Aviation Corporation. Major John F. Probst has been assigned by the U. S. Air Force as liaison officer to the symposium.

A chairman will be designated by each of the four sponsoring technical societies. Each such chairman will preside during the presentation and discussion of the paper by a member of his society. Such discussion by prominent authorities in the field will constitute an important part of the symposium.

Largest Knuckle-Joint Press

The largest Knuckle Joint press ever built was recentlly shipped to Regal Ware, Incorporated, Kewaskum, Wisconsin by E. W. Bliss Company. The press has a capacity of 4000 tons, stands 34 feet and weighs 305 tons. Bed area is 60" x 70".

The giant press will be used by Regal Ware for coining and extruding operations on steel artillery cases. Bliss equipped it with a six-station ratchet dial feed, 59" diameter, with electrical protection for safer indexing. A 200 horsepower motor drives the press at 12 strokes per minute through double gearing. Slide adjustment of 1" is motorized with micrometer indication and can be locked in positive position.

Can be used on any drill press, lathe or electric drill.

Generates round, straight surfaces with any desired surface finish.

For complete information write or call

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT . . . DETROIT 4, MICHIGAN

Small Self-Contained Drilling Unit

The Drillunit is a small self-contained large capacity, long stroke unit with its spindle direct-driven from an electric motor through vee belts. Changes in spindle speeds are made by selecting the proper standard sheaves and belts.

It is designed so that the work load thrust is independent of the feed rate. The rapid traverse rate is adjustable within the range normally required by the user. Thus, if the user finds that the traverse rate for a particular production job would be better if it were slowed down or speeded up, then he would be able to do this with this machine.

The automatic cycle of this unit includes rapid approach, feed, rapid turn and stop. A positive stop and timer must be used for dwell and return cycle. That is, as the quill of the unit is feeding forward in the feed position and the facing tool comes to a positive stop, which is either mounted on the machine or fixture, the pump will dead head. For this reason a timer will have to be used to cause the quill to retract. Jump-gap performance is obtained by cam construction, with the addition of dogs and switches installed on the unit to meet the requirements of the user's job. This set up assures permanent and positive functioning.

In addition to the cycling being completely hydraulic, the Drillunit features the fewest number of parts and the most basic principle of operation, combined with the most adequately rugged construction. Severe cycle applications are easily performed with an efficiency which results in cool, rapid, accurate and dependable repetition.

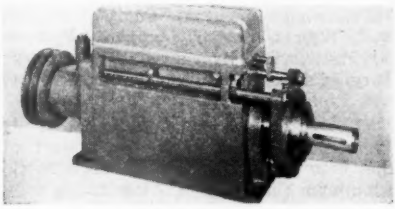


Photo courtesy Drillunit, Incorporated

A variable displacement hydraulic pump, driven integrally with the spindle, is readily replaceable without disturbing the mounting or tools. The spindle is removable from the front of the unit without removing the quill or pump and are available for single tool or multiple tool drive applications.

Spindle rotation can be in either direction. Minimum spindle speed should not be less than 300 rpm nor more than 2000 rpm.

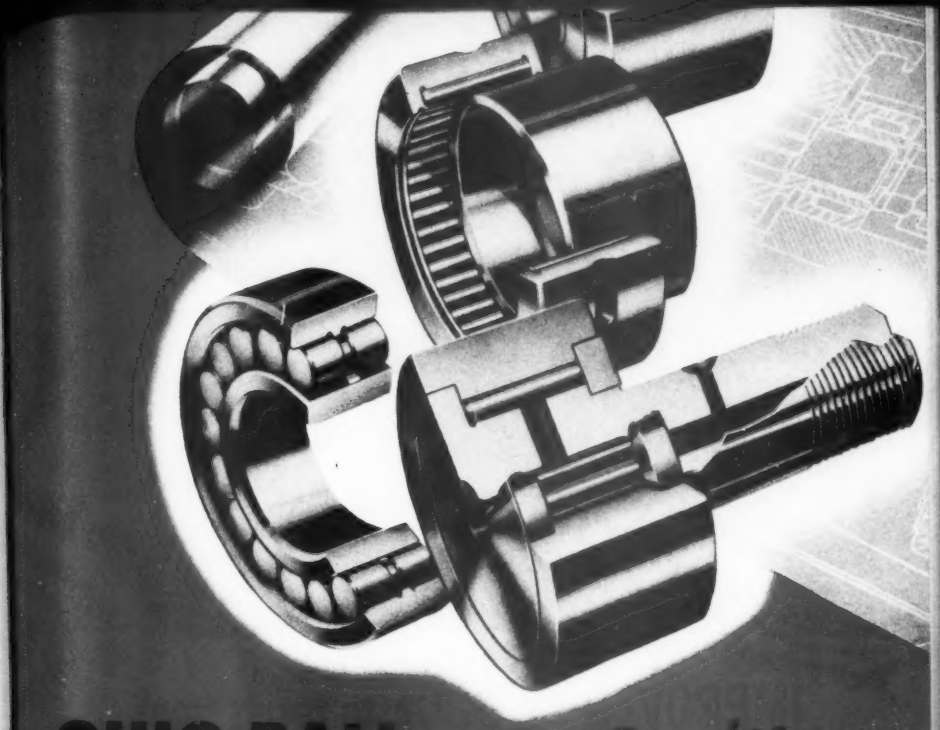
The unit may be mounted in any position although operation requirements must be specified. Counterweights are unnecessary when the unit is mounted vertically, as pressures on the return stroke are nearly equal to pressure on the forward stroke.

The unit can be furnished with the spindle running clockwise or counterwise as specified. Spindles running counterclockwise make multiple head design very simple.

The thrust capacity of the unit is approximately ½" in steel; size of cylinder: 1.750; stroke—9" and 12"—diameter of piston rod—1-$\frac{3}{16}$".

The Gatco Rotary Bushings Co. are now in their modern new plant at 42330 Ann Arbor Road, U. S. 12, Plymouth, Michigan. The company was established in 1913 by J. P. Giern and A. P. Anholtt who are well known as the originators of the rotary jig and pilot bushing.

This old firm has made a steady progress year after year in this service to the automotive and allied industries.



OHIO BALL *at your Service*

McGILL®
full type roller bearings

MULTIROL®
full type roller bearings

GUIDEROL
Trade Mark
full type roller bearings

• Modern, high speed precision machinery requires bearings that are built with the same care and skill and the same close tolerances as the machine itself. That is why we are glad to be able to supply these fine bearings wherever their use is indicated. Let our engineers show you how your equipment and design can be improved with the use of these *modern* bearings. Where the dimensional advantages of needle type roller bearings are needed, McGill full type roller bearings provide maximum load carrying capacity in a limited radial space.

Ask for your FREE copies of the "AFBDA Bearing Maintenance Report"!

The OHIO Bearing Specialists
BALL BEARING CO.
BALL-ROLLER and THRUST BEARINGS
UTah 1-2828 • 3634 EUCLID AVENUE • CLEVELAND 15, OHIO

MEMBER AFBDA
ANTI-FRICTION BEARING DISTRIBUTORS ASSOCIATION

IMPROVED SERVICE to result from TELCO'S move to new quarters!

● We are moving to larger quarters in order that we may provide you, our customers, with better service than ever before. Our new 4200 square foot building at 4030 Superior Avenue greatly increases our warehouse and shipping facilities. We will be able to carry larger inventories . . . make faster deliveries.

Normal operations will be maintained during the move. Our new quarters should be completely settled by August 15th. Accept this as our invitation to come in and look us over. A-5952

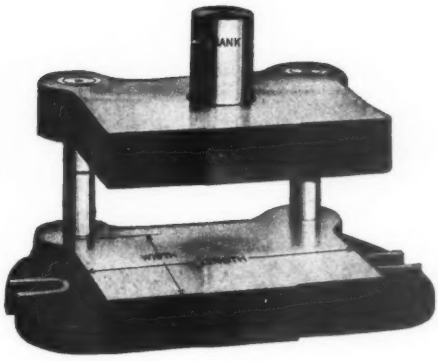
TELCO

TRUMAN E. LONGLEY CO.
4030 SUPERIOR AVENUE
CLEVELAND 3, OHIO

DRILLS, TAPS, CARBIDE TOOLS, ROTARY FILES, FILTERS, AIR CYLINDERS, VALVES & CONTROLS, AIR COMPRESSORS & PUMPS, MACHINERY & EQUIPMENT

ENdicott 1-1560
call TELCO SUperior 1-4817

HIGH PRODUCTION BAUMBACH DIE SETS AT SHORT-RUN DIE SET PRICES!



WITH IMMEDIATE DELIVERY FROM STOCK from

JERGENS

SAVE ON FREIGHT CHARGES—GAIN ON TIME!

Now, Jergens offers all Ohio Industry the superiority of Baumbach Die Sets plus the advantage of immediate shipment from stock with substantial savings in freight.

Baumbach Die Sets have long been famous for superior engineering, ruggedness of design, long-life, precision machining and quality finish. Now they're as close as your telephone or "short-run" trucking service.

Investigate how Jergens "one-stop" service for Baumbach Die Sets—Allen Fasteners and Jergens Jig and Fixture Standards save your time and money.

Write Today For Complete Details on Baumbach Line!

Jergens
TOOL SPECIALTY CO.
12 E. 163rd ST. CLEVELAND 10, OHIO

JERGENS TOOL SPECIALTY CO.
712 E. 163rd St.
CLEVELAND 10, OHIO
Please rush complete information and price list covering your fast service from stock for Baumbach Die Sets.

NAME .....
COMPANY .....
ADDRESS .....
CITY ..... STATE .....

Hard Chrome Plating . . .

. . . and "Dimonizing"

PICKUP AND DELIVERY IN CUYAHOGA COUNTY

- To reclaim worn dies, tools, gages, etc.
- To salvage mis-machined parts.
- To increase wear-life 3 to 10 times.
- Service Engineers always on call.
- One to a million pieces.

OPEN DAY AND NIGHT Call WOodbine 1-2012

*At MASTER CHROME you will find experienced MASTER PLATERS to give you fast service and quick delivery. MASTER CHROME maintains a fleet of service cars and trucks to complete a real MASTER CHROME SERVICE.

The oldest and largest firm in the mid-west specializing on HARD CHROME only.

MASTER CHROME SERVICE, Inc.

MASTER HARD CHROME PLATING

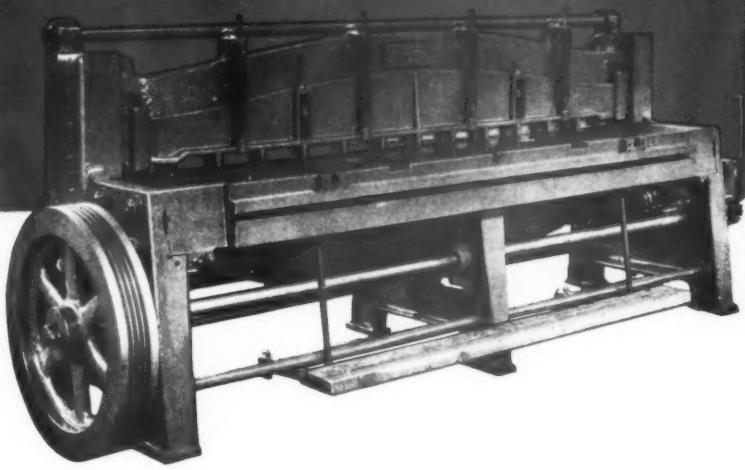
5711 HERMAN AVENUE N. W.

WOodbine 1-2012 Cleveland 2, Ohio

REBUILDING

SHEET METAL WORKING MACHINERY

(PUNCH PRESSES • PRESS BRAKES • SHEARS)



Shown above is a SQUARING SHEAR as it appeared after rebuilding from an almost total wreck. Put into its original first class working condition, it is serving an extended life at a relatively small expense and with very little delay.

FULTON FOUNDRY & MACHINE CO., INC.

East 75th & Morgan Avenue • Cleveland 27, Ohio • Phone MI 1-8400

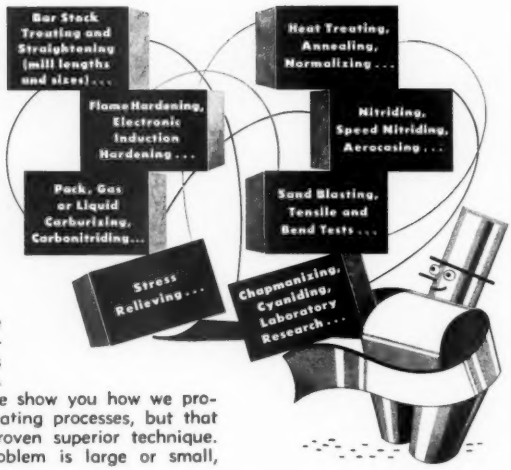
EQUIPPED FOR HEAVY, MEDIUM OR LIGHT JOBBING PRODUCTION

HEAVY JOBBING MACHINE SHOP—METALIZING

MEEHANITE CAST IRON STEEL BRIDGES THE GAP

Flexible in Range... RIGID in Quality

Lakeside's Scientific STEEL TREATING


Bar Stock Treating and Straightening (mill lengths and sizes)...
Heat Treating, Annealing, Normalizing...
Flame Hardening, Electronic Induction Hardening...
Nitriding, Speed Nitriding, Aerocasing...
Pack, Gas or Liquid Carburizing, Carbonitriding...
Sand Blasting, Tensile and Bend Tests...
Stress Relieving...
Chapmanizing, Cyaniding, Laboratory Research...

The flexible facilities of Lakeside can handle your steel treating—Our rigid scientific quality controls promise a better treating job. A glance at our services listed above show you how we provide not only the usual metal treating processes, but that we also pioneer each new and proven superior technique. Whether your metal treating problem is large or small, call Lakeside today!

THE *Lakeside Steel Improvement Co.*

5418 LAKESIDE AVE., CLEVELAND 14, OHIO HENDERSON 1-9100

American Foundries Company, Milan, Michigan, announces the appointment of **George Uhle, Sr.** and **George Uhle, Jr.** manufacturers agents, as their representatives in the Cleveland and urban areas. In additon to representing **American Foundries Company** for alloyed, semi-steel and gray iron, semi-production and machine tool castings, up to 25000#, they also represent **Taylor & Boggis Foundry Company,** production gray iron castings, and **Mohawk Foundries, Inc.,** aluminum castings, Cleveland. George Uhle, Sr. was identified with the major leagues for upwards of twenty years, approximately ten years of which were with the Cleveland pitching staff.

C. H. Rodgers & Co., Cincinnati, Ohio, representative of the **Detroit Die Set Corporation,** is now located in new and larger quarters at 4271 Harrison Ave. The Cincinnati company will maintain a complete stock of factory-assembled and factory-tested die sets.

WHAT'S MY LINE?

No guesswork when you use our line of

PRECISION INSPECTION EQUIPMENT!

- **Herman** (the original) **Pink Granite Surface Plates**
- **Fonda** Steel & Carbide **Gage Blocks**
- **Gem** Toolmakers Indicators
- **Micrometers, etc.**

SYBRANDT CO., Cleveland 3, O., HE 1-7447

all types, sizes in stock now!

Order from DIE-CO for prompt service! Complete variety—Socket Type Shoulder Screws, Socket Head Cap Screws, T-Slot Bolts, Nuts & Washers, Hollow Set Screws, Socket Flat Head Cap Screws, Socket Button Head Screws, Hollow Pipe Plugs, Allenuts, Square Head Set Screws, Flexloc Nuts, Lockwashers, Hex Wrenches & Key Sets, etc. All top quality, in widest range of sizes and types to fit every need.

The DIE SUPPLY Co.

DIE-CO

1400 Brookpark Rd. • Cleveland 9 • SHadyside 1-9000
915 Valley Street • Dayton 4 • Michigan 9691
122 S. Sheridan Ave. • E. E. Pittsburgh 6 • EMerson 1-0463

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

PUBLICATION

Keep Informed! CATALOGS • BULLETINS • SPECIFICATIONS

Press Safety Controls of universal application are featured in an illustrated catalog from the Tech-n-kal Machine & Engineering Co., 12925 Auburn Rd., Detroit 23, Mich. Brake, clutch, and pilot circuit are effectively policed by electronic controls working in combination. All controls are simple, with push-button operation.
Inform-A-Gram No. B1.

Atlantic Precision Contour Saw makes routine of complex work in thick tool steel plate. Different set blades are available, and inside and outside contours may be easily cut. Write for your copy of saw blade circular to the Atlantic Saw Mfg. Company, Inc., Brewery Street, New Haven, Connecticut.
Inform-A-Gram No. B2.

famco (COST CUTTING) machines

FAMCO MACHINE COMPANY

3124 SHERIDAN ROAD • KENOSHA, WISCONSIN

Famco proudly announces the purchase of new plant and office facilities at Kenosha, Wisconsin. Part of an expansion program undertaken by Famco, the new buildings — situated on twelve acres overlooking Lake Michigan — add substantial floor space to Famco's operation . . . with sufficient ground for further expansion as needed. It is requested that all future contact with the Company be made at the above address.

AIR PRESSES • ARBOR PRESSES • BAND SAWS
DRILL PRESSES • FOOT PRESSES • POWER PRESSES
POWER AND FOOT SQUARING SHEARS

Revolutionary New Pilot Bearing Bushing provides absolute seal against grit and dust. The entry of grit or dust into the outer seal actually increases the effectiveness of the seal. Cartridge-type design of the bearing holder offers great accuracy, protects against both thrust and radial loads and offers a great support due to the overall length of the bushing. Suitable applications include use for steady rest and back-up rolls, internal centerless grinder pressure rolls, grit blasters, tumbling barrels, and conveyor rollers. A catalog with full details is available from the manufacturer, J. G. Jergens Co., 11106 Avon Ave., Cleveland 5.
Inform-A-Gram No. B3.

Vernier Depth Gage has design permitting the use of 1" scales. Wm. A. Koenig, 108 Mt. View Avenue, Troy, N. Y., manufactures this new and extremely versatile gage. Scales and Verniers have machine divided graduations in thousands, while the head is hardened, ground and lapped. Hook scales of any size are available for intricate work. Write for your copy of literature describing this attractively priced gage to the manufacturer at the New York address.
Inform-A-Gram No. B4.

The Rimat Dial Bore Gage measures directly across the diameter of the bore. Mechanism is simple, rugged, and accurate, and correct readings are obtained by rocking the measuring head in the bore and noting minimum indicator dimension. Special measuring tip design allows measurement of oil ring, "O" ring, and snap ring grooves. Bulletin T-2 from the Rimat Machine Tool Co., 1117 Air way, Glendale 1, Calif.
Inform-A-Gram No. B5.

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

Carbide Tipped Milling Cutter Combines Advantages of Solid and Inserted Blade Types. Interchangeable blades are seated on periphery of cutter body with tail end seated against an abutment in the body. Cutting forces are transmitted to the body through this abutment. Heat treated body bound screws accurately locate the blades against the body abutment through a conical seat. Bodies can be bladed for straight slotting, alternate blade slotting, or half side milling. Changes in rake or shear angles may be made very quickly, and since there are no wedges, serrated surfaces or body slots, there is absolutely no danger of body damage. Standard plain and side cutters now available in widths of ½" and ¾", ranging in diameter from 3 to 8 inches. Specials to request. Brochure and price list from Millit Division: Kraus Design Inc., 49 Flint Street, Rochester 8, New York.
Inform-A-Gram No. B6.

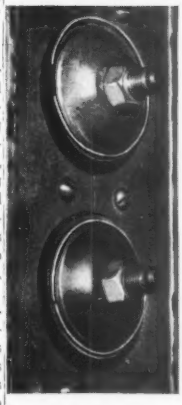
A Range of Centrifugal Coolant Pumps, one model designed specially for grinding operations, are featured in a catalog available from Associated Engineers Inc., Box No. 1628, Springfield, Mass. The catalog shows operational curves and cut-away drawings for all models. Model CF capacity ranges from a fraction of a gallon to 21 gallons per minute free flow.
Inform-A-Gram No. B7.

A Compact Industrial Chilling Machine especially suitable for testing procedures with temperature requirements of -10 to -80 degrees F. is now available from Sub-Zero Products, Cincinnati 29, Ohio. Known as model R-70, the machine has a chilling chamber 30" by 18" by 33" deep, with more than 22 square feet of freezing surface.
Inform-A-Gram No. B8.

Niagara Air Powered Squaring Shears are detailed in a four page illustrated bulletin from Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, New York. The bulletin deals with construction, new features, specifications and operation of the line, models of which have capacity of between 3 ft. in 16 gage to 10 ft. in 18 gage mild steel.
Inform-A-Gram No. B9.

The I.S.V. Single Plane Static Vertical Balancing Machine is described in a catalog sheet from Gisholt Machine Co., 1199 E. Washington Ave., Madison 10, Wisconsin. Three other models of static and dynamic balancing machines are also specified. A specially designed cradle arrangement permits readings of movements as small as .000025".
Inform-A-Gram No. B10.

Stress-Relieved
NOTCH-COIL RINGS
UP SILVER BRAZING
800%



SILVER BRAZING gas strainers for refrigerators jumped from 60 to 480 per hour when stress-relieved, notch-coil rings replaced individual, machine-wound rings. Ordinary rings (top left) fell away from joint, resulting in poor bond, spillage and need for machining of brazed parts. Rejects and hard-to-handle individual rings made method too slow and costly.

STRESS-RELIEVED RINGS retained ±.001-inch tolerance at all times, permitting mass brazing. Rings snap to specified tolerance to form a gas-tight bond, and snap off coil, snap on assembly in one time-saving motion. Costs were cut 74%, rejects 95%. Waste, spillage and machining were eliminated. Rings are made from *SILFOS* and *EASY-FLO* in *any* wire thickness and diameter in *butt*, *lap* and *gap* form.

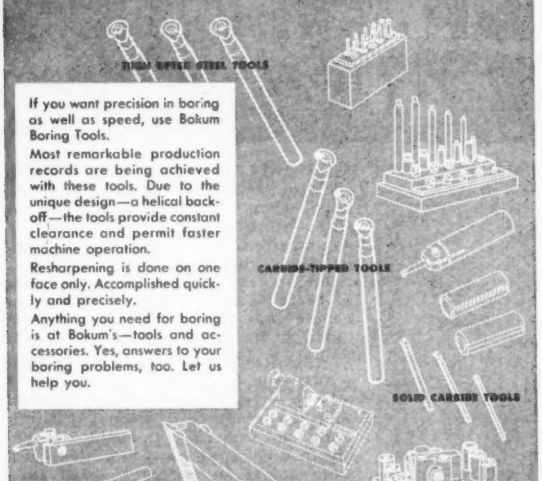
LUCAS-MILHAUPT ENGINEERING CO.
5059 SOUTH LAKE DRIVE, CUDAHY, WIS.
Suburb of Milwaukee

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

More Efficient Drilling is possible with Elf drill lubricators. In use at the plant of a major aircraft manufacturer they reduced drill breakage 22%, allowed the increase of cutting speeds while improving the life of the drill cutting edges, and reduced rejects from oversize holes. Because of their general cleanliness and ease of application they also overcome operator objections to using a lubricant. Each of these solid lubricators lasts an average of three weeks of eight hour days. Write to Aviation Lubricants Co., Inc., 1921 India St., San Diego 12 Calif. **Inform-A-Gram No. B11.**

The May-Fran Hinged Steel Conveyor Belt is sturdily constructed to withstand extreme wear, and is recommended for handling metal scrap, hot forgings, flash, wet or dry metal chips and turnings as well as other sharp or abrasive materials. It can be assembled to almost any width and length from stocked components to meet the needs of specific applications. The new catalog No. MF-30 contains photographs illustrating part and construction details, and will be sent by May-Fran Engineering Inc., 1726 Clarkestone Road, Cleveland 12. **Inform-A-Gram No. B12.**

HERE'S EVERYTHING FOR
PRECISION BORING and INTERNAL THREADING



If you want precision in boring as well as speed, use Bokum Boring Tools.

Most remarkable production records are being achieved with these tools. Due to the unique design—a helical back-off—the tools provide constant clearance and permit faster machine operation.

Resharpening is done on one face only. Accomplished quickly and precisely.

Anything you need for boring is at Bokum's—tools and accessories. Yes, answers to your boring problems, too. Let us help you.

BOKUM TOOL CO.
TRADE MARK REG. U. S. PAT. OFF.
SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS
DEPT. E • 14775 WILDEMERE AVE. • DETROIT 21, MICH.

Life-Line Motor Case History Booklet available from Westinghouse. Over 100 case-histories of outstanding applications of Life-Line motors represent practically every phase of Industry. Metalworking, production tool, textile and chemical industries are among those instanced. Histories give particular application problems involved, motor choice for the job, and the results. Booklet B-4769, Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pa. **Inform-A-Gram No. B13.**

Versa-Mil Lathe Attachment For Milling, Boring, And Grinding. New brochure pictures and describes numerous applications of Versa-Mil to difficult machining jobs. This lathe attachment produces precision results and allows multiple operations in the original lathe set-up, making for accuracy and speed of production. Brochure contains prices of attachment and complete accessories, with drawings and specifications. Write Versa-Mil Company, 33 West 42nd Street, New York 36, New York. **Inform-A-Gram No. B14.**

Desmond-Simplex Vises are covered in a new 24-page catalog. Fast-reading text and clear pictures show features and applications, and ordering for particular needs is made easier by quick identification of vises by model and size. Ordering of repair parts is facilitated by complete listing with drawings on a separate page. All models of industrial, woodworkers and home utility vises are covered. Copies from Desmond-Stephan Mfg. Co., Urbana, Ohio. (Catalog 60) **Inform-A-Gram No. B15.**

A Set Screw Catalog which constitutes a valuable reference work and at the same time gives exhaustive data on most standard and special types of set-screw, has been newly issued by Set Screw & Mfg. Co., 158 Main Street, Bartlett, Illinois. **Inform-A-Gram No. B16.**

A New Catalog Deals With Solid Carbide Tools, end mills, center laps, grinding tools, reamers, midget burrs, and rotary files, both standards and specials. The catalog will be sent on request by R. L. Schmitt Co., 6536 Roosevelt, Allen Park, Michigan.
Inform-A-Gram No. B17.

Diamond Tools & Their Correct Applications. The Standard Diamond Tool Corporation, 64 West 48th Street, New York 19, N. Y., has recently issued a folder "3 Factors To Consider When Purchasing Diamond Tools", which contains valuable information on how to best effect production economies using this type of tooling. The company makes a complete range of industrial diamond products, and invites presentation of your problems for consideration by its engineers.
Inform-A-Gram No. B18.

Stokes Tabletting Presses for powdered metals, plastic preforms, general industrial and pharmaceutical production are pictured and described in new bulletin. All models of single punch, rotary, mechanical and hydraulic presses are included. Special emphasis is given to press design and fabrication. Mechanical details of frames, shaft bearings, drive hoppers and feed mechanisms are given, with information on punches and dies, including die materials and shapes. Cata. 800, F. J. Stokes Machine Co., 5500 Tabor Rd., Phila. 20, Pa.
Inform-A-Gram No. B19.

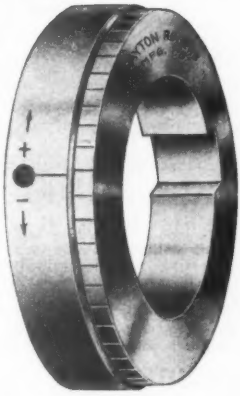
A Catalog of Toggle-Action Clamps, Pliers, and Wrenches, No. "R-10", has been issued by Lapeer Mfg. Co., 3056 Davison Rd., Lapeer, Michigan. The catalog features an expanded line of Knu-Vise pneumatic clamps offering toggle bar forces from a feather touch to well over a ton, in addition to the complete range of mechanical-action products.
Inform-A-Gram No. B20.

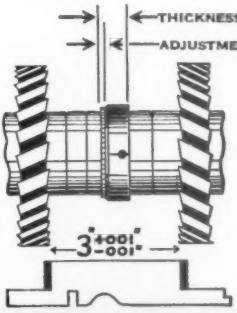
Unilap Diamond Abrasive is compounded in an exclusive new medium, with a different color for each grade, and is packaged in convenient tube or efficient applicator cartridge, or in recently introduced 5-gram jars. It is supplied in six standard grades only, each precisely engineered to perform the widest variety of lapping jobs at lowest cost. Composition within each grade is invariably consistent, so that when the right grade has been selected for a job, results can be predicted with certainty. Write for your copy of catalog to Union Wire Die Corporation, 71 West 45th Street, New York 19, New York.
Inform-A-Gram No. B21.

Cool Honing And Free Stock Removal are made possible by a new water soluble coolant, Pelron ✱ 560. This coolant combines the heat dissipating qualities of water with the cleansing and anti-rust qualities of kerosene. It contains a high percentage of liquid detergent, an extreme pressure agent, and a rust preventative and is best used in concentrations of 15-20 to 1, depending on individual requirements. The coolant is non-inflammable, non-volatile, and gives clean handling. Complete technical information is available by writing Pelron Corporation, 7740 W. 47th Street, Lyons, Illinois.
Inform-A-Gram No. B22.

SAVE TIME on GANG MILLING SET-UPS

Dayton Rogers *hardened and ground* adjustable spacing collars *do* save considerable time on set-ups for gang milling. After making a trial cut the cutter arbor nut is loosened and the necessary plus or minus adjustment is made with a handy wrench which is furnished. Collars are graduated in increments of .001".





They are stocked for cutter arbors from 5/8" to 2". You'll like the speed, the precision, and the time saved!

Write Today For More Information!

DAYTON ROGERS *Manufacturing Company*
2833 13th Ave. S
MINNEAPOLIS, MINNESOTA

All Types Of Stainless Steel Fastenings are listed and specified in a new catalog. Illustrations of the product in each classification quickly identify the various items. The product categories include all types of screws, nuts, bolts, washers, pins, rivets, nails and studs. On the four pages devoted to stainless steel specialties, illustrations help describe fully the various types of fittings. Copies from Star Stainless Screw Co., 195 Union Ave., Patterson 2, N. J. The company gives fast service on specials.
Inform-A-Gram No. B23.

Many Airfoil Grinding Problems are solved with the new P & W turbine blade airfoil grinder, which, by duplicating from a master cam, allows an automatic grinding cycle with consistently uniform accuracy. The machine will produce any irregular or twisted section, with tolerance held to .003". Remarkable ease of operation is a feature of great interest. Semi-skilled personnel can be used successively as machine loaders, and a single operator can serve a battery of machines. Write Pratt & Whitney, West Hartford 1, Conn.
Inform-A-Gram No. B24.

AIR-MITE AIR CYLINDERS

SINGLE ACTING

Miro

DOUBLE ACTING

Clevis

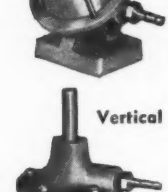
Worth Their Weight in GOLDen Man-Hours

Save time, spoilage, cost . . . speed production . . . reduce fatigue . . . on all drilling, reaming, tapping and processing jobs. Available in 1", 1½", 2¼", 3", 4" and 5" diameters; stroke length optional. Single or double action; all mountings.

Write for complete catalog of Air Cylinders and Air Arbor Presses.

AIR-MITE 4417-B West Carroll Ave. Chicago 24, Illinois

Vertical



Vertical Face

Parallel

"EB" Silver Brazing Alloy is a new metal-joining composition primarily intended for brazing chromium carbide, cast carbides, and other "hard to wet" materials. The new alloy is composed of 57% silver, the balance of the composition includes copper, manganese and tin. It has a melting point of 1120° F., and a flow point of 1345° F. There are no volatile elements in this alloy, an important factor in vacuum applications, and it is non-susceptible to dezincification type of corrosion. It has been successfully used on type 316 stainless steel to dilute mineral acid corrosion. Handy & Harman, 82 Fulton Street, New York 38, New York.
Inform-A-Gram No. B25.

Push Button Control Model Added To Hoist Line. To answer the demand for maximum efficiency and ease of operation the Chisholm-Moore Hoist Corporation, Fremont Avenue, Tonawanda, New York have added a push button control model to their line of Comet electric chain hoists. Available in capacities from 250 to 2,000 lbs., power can be tapped from any single phase lighting circuit, 220 or 440 volt power line. Many excellent design features make this model an ideal production line hoist. Write for catalog No. 150, containing full description, prices, and specifications for all models.
Inform-A-Gram No. B26.

Power Tools. A new 52-page catalog, on power tools for cutting, drilling, shaping, and finishing metal, plastics, wood and fibre has just been published by the Boice-Crane Company, 963 Central Avenue, Toledo 6, Ohio. Intermediate capacity band saws, countour saws, band filers, drill presses, tool grinders, jig saws, jointers, lathes, planers, shapers, saw-jointers and belt, drum, and spindle sanders are fully described and illustrated. Request Catalog No. 52.
Inform-A-Gram No. B27.

Graphic Illustration Helps Speed Machining Operations today in many progressive plants. Production illustrations are three-dimensional perspective drawings, and are especially valuable to semi-skilled or unskilled workers, either machine operators or on the assembly line, who have difficulty in interpreting blueprints. However, the crystal-clearness of graphic illustrations has proven a profitable aid to personnel on all levels. Reproduced in quantity by ordinary blueprint methods, they form a convenient reference guide and instruction sheet which supplements or replaces blueprints. Walter Production Illustrations, 4255 Woodward Avenue, Detroit 1, Mich.
Inform-A-Gram No. B28.

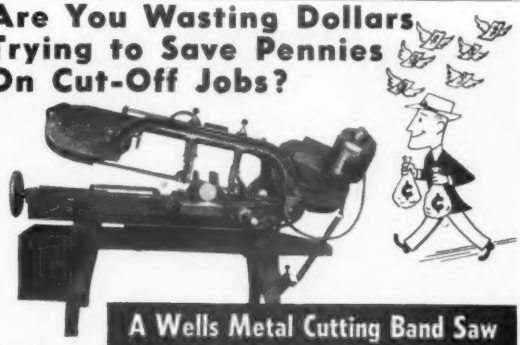
The Lassy Model 12-F Hand Tapper incorporates a direct reading depth-gauge which shows the exact depth of the tap in the work, and prevents breakages. Hand wheels of aluminum alloy with four hollow steel handles provides strength and lightness for good tap "feel". These and other well engineered features help the machine give good results even with inexperienced labor. Descriptive literature also gives details of the Lassy Universal Tap & Die Guide, and the Lassy Work-Holder, for turning and grinding set-ups. Write Lassy Tool Company, 96 Bohemia Street, Plainville, Connecticut for your copy.
Inform-A-Gram No B29.

Special Machinery Making Facilities are described in the latest bulletin from Klaas Machine & Mfg. Co., 4314 East 49th Street, Cleveland 25, O. The Company contracts and manufactures special machinery for metal forming and machining, special assembling, heat-treating, flame-hardening, and quenching, and general press-work. The bulletin also has a section on special machinery for materials handling. Enquiries are invited.
Inform-A-Gram No. B30.

Acmor Hollow Pin Conveyor Chain has design features allowing easy attachment of a wide variety of carriers. This important flexibility is backed by other essentials such as large glass-hard bearing areas, low weight with high strength and accurate pitch, an assembly method that prevents wear in the chain sidebars, and ease of repair and replacement. A new bulletin discusses chain design at some length, giving illustrations and exploded views of the Acmor design. For your copy write Acmor Conveyor Chain Company, 17100 Miles Ave. Cleveland 28, O.
Inform-A-Gram No. B31.

New Catalog No. 40 Describes Rotor Vertical Grinders. Latest models of these grinders have very good power weight ratio, and use magnesium castings with steel wearing plate to reinforce front. Design features include 7½" height for heavy duty model, twin position dead handle, replaceable cylinder liner and bronze end plates. Speeds of 6,000, 5,000, 4500, and 3500 rpm are available, and wheel guards are furnished when the tool is ordered as grinder or cut-off machine. Rotor Tool Co., 17325 Euclid Ave., Cleveland 12.
Inform-A-Gram No. B32.

Are You Wasting Dollars Trying to Save Pennies On Cut-Off Jobs?



Wells No. 8 with wet cutting system.

A Wells Metal Cutting Band Saw pays for itself in savings

IT'S easy to fool yourself about costs on your cut-off jobs. Perhaps you say, "It doesn't amount to much, why worry about how we do it." You'd be surprised. Look at what a Wells Saw gives you—Modest first cost with a model for every budget . . . Rugged, heavy duty construction for minimum cost per year . . . Fast, continuous band saw cutting . . . Accurate cutting to minimize subsequent machining . . . Simple operation that requires no special skill.

To cut your cut-off costs, ask your Wells Distributor for further information or write direct.

Standard Wells Saws: No. 49A—3½" x 6⅝"; No. 5—5" x 10"; No. 8—8" x 16"; No. 12—12" x 16". Wet cutting systems available for Nos. 5, 8 and 12. Automatic bar feed available for Nos. 8 and 12. Special machines for capacities to 48" x 48".

Wells saws

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1949 CEDAR ST., THREE RIVERS, MICH.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Standard Optical Comparator Charts that are available for use on any make and model of projector are the subject of a new illustrated catalog from the Gage Company, Battle Creek, Michigan. In addition to usual radius and angular layouts, American National Thread Form, Dryseal Taper Pipe Thread Form, and Unified-American Thread Form System inspection charts are completely covered. These and many other similar items are conveniently listed, and are illustrated comprehensively by miniature pictures. Write for catalog No. 51-1952.
Inform-A-Gram No.. B34.

New Vacuum Metallizing Brochure Issued By Stokes. The basic principles of vacuum metallizing are outlined and schematically illustrated in this 12-page brochure, the complete process being thoroughly covered, with sections on pretreatment, drawing of vacuum, metallizing and finishing. Vacuum metallizing has been known as a laboratory project for more than fifty years, but now, as a result of technical advances, for many purposes it is superior to electroplating. For instance it is fully serviceable for coating nonconductive materials, and also offers exceptional speed and production economies. The brochure provides valuable information on how to produce a better metal-finished product at marked decreases in production cost. In addition, Stokes offers a sample metallizing service. Copies of "Vacuum Metallizing Today" — catalog No. 725—and a product test run, may be had through contact with F. J. Stokes Machine Co., 5500 Tabor Road, Philadelphia 20, Pa.
Inform-A-Gram No. B35.

ACCURATE...
to ± 1 pt. ROCKWELL!
to ± 5 pts. BRINELL!

NOW! *At-the-job, direct readings,* of all metal types, sizes and shapes. Quick and simple . . . just press handgrips, read dial. Unskilled labor can test assembly line work. No conversion scales, no calculations! Ideal for parts, finished products no matter how large or small. Rockwell "A", "B", "C" scales. Low and medium Brinell scales. Both standard and superficial readings in one instrument!

WRITE NOW FOR BULLETIN ET 305

MANUFACTURED IN THE UNITED STATES
NEWAGE INTERNATIONAL, INC.
235 EAST 42nd STREET • NEW YORK 17, N. Y.

"Lewis 1500" Electronic High Frequency Heating Unit. New brochure illustrates soldering, brazing, and other controlled heat applications of the unit, describes automatic timer control features and other economy aspects. Cut-away photos and specifications also shown. Dept. KP, Lewis Machine Company, 892-4 Newcomb Street, St. Paul 6, Minn.
Inform-A-Gram No. B36.

Low Hydrogen Electrode Stabilizer. This efficient moisture-content stabilizer that provides protection for low hydrogen welding rods against the defects caused by moisture-laden electrode shielding is produced by Fred C. Archer Inc. Write for literature on the model 400 SEA Blueweld Lo-Hydrogen Electrode Stabilizer to this company at 606 West Wisconsin Avenue, Milwaukee 3, Wisc.
Inform-A-Gram No. B36.

The New Brush Welding Analyzer, which graphically records welding current, electrode force, and other variables in both single and three phase resistance welding, is described in a catalog from the Brush Development Co., Instrument Division, 50F, 3405 Perkins Ave., Cleveland 14. The primary usefulness of this equipment is in the investigation of the magnitude and timing of welding variables, consistency of operation of the welding equipment, and the calibration of the equipment.
Inform-A-Gram No. B38.

The Improved Line Of Series 1800 Shear-Speed Radial Gear Shapers built by the Michigan Tool Co., is described in a new bulletin 1800-52, available from the manufacturer at 7171 E. McNichols Rd., Detroit 12. Latest applications are described and illustrated, and complete specifications for the four models in the line given. Design changes include improved head, with handwheel controlled cutter removal, and relocated, electrical control panels.
Inform-A-Gram No. B39.

Small lot stampings, molded plastics, pneumatic die cushions and counterbalance cylinders, micrometer adjustable spacing collars for all gang milling operations, and a new method of trimming all shapes of drawn shells are only a few of the subjects discussed in a new and extremely comprehensive catalog entitled, "Dayton Rogers Products and Services." Details of the small lot stamping service are particularly interesting. No matter how small the quantity requirements or how intricate the piece part design may be, accurate die cut stampings can be produced more economically than by any other method. In most cases the short run tools cost no more than 15% to 20% of the conventional permanent type tools. The Dayton Rogers Mfg. Company, Minneapolis 7, Minn.
Inform-A-Gram No. B40.

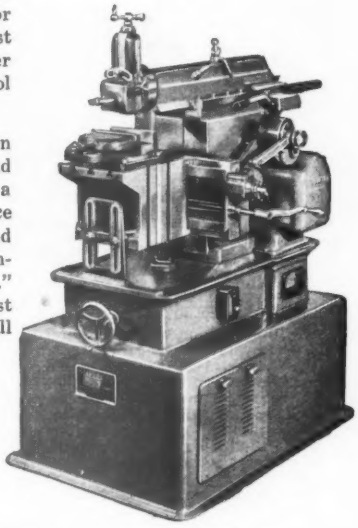
Marking Devices are given an exhaustive listing in a new catalog from the Dickey-Grabler Company, 10302 Madison Avenue, Cleveland 2, Ohio. Reverse steel letter and figure sets, engraved steel hand and hammer stamps, steel machine stamps, adjustable and standard roller marking dies, and standard and special embossing dies are all illustrated and discussed. In addition, there are pages on multi-wheel numbering machines and nameplate detail presses. High quality workmanship and materials are marked throughout the range.
Inform-A-Gram No. B41.

The Lindberg-Fisher Two-Chamber Induction Melting Furnace dispenses with the need for separate meltdown and holding furnaces. The meltdown of the ingot and scrap is done in a melting chamber, while the molten metal in the adjoining ladling chamber is held at desired casting temperature. Need for handling molten metal between one furnace and another is therefore eliminated, together with radiation heat losses and operator fatigue. Furnaces are built in 9 standard sizes. Bul. 560, Lindberg Eng'g Co., 2450 W. Hubbard St., Chicago 12.
Inform-A-Gram No. B42.

Big Shaper Performance Small Shaper Price

The SHELDON 12" Back-Geared Shaper is neither too big, nor too small. It is just right for most shaper work in most tool rooms and shops.

In weight, design features, capacity and performance, it is a "big shaper." In price operating cost and floor space, it resembles a "small shaper." It is the logical 1st shaper for the small shop and a cost-cutting tool in multiple installations in large plants.



Write for Catalog

SHELDON
CHICAGO

SHELDON MACHINE CO., Inc., 4235 N. Knox Ave., Chicago 41, Ill.

A New Line Of High Speed Forging Presses is described and illustrated in a four-page leaflet issued by the E. W. Bliss Company, Canton, Ohio. Identified as catalog No. 42, it contains complete specifications for the presses which are available in capacity sizes from 300 to 4000 tons. Features of the line include self-contained die seats with easily operated wedge adjusting mechanism, heavy duty air operated friction clutch mounted directly on the main full-eccentric shaft, and continuous long gib ways at the front of the slide which extend up into the crown to return die alignment when off-center loads are applied.
Inform-A-Gram No. B43.

The Elgin Model "G" Utility Pneumatic Hammer is described in a new catalog sheet from the Borm Mfg. Co., Elgin, Ill. This hammer has an exclusive neat design, and rugged construction, is 8" long, and has a speed of 500 strokes a minute on 100 lbs. air pressure. pressure of 500 strokes a minute.
Inform-A-Gram No. B44.

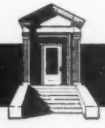
Industrial Hose Assemblies for all purposes are the subject of a comprehensive catalog from the Carlyle Rubber Co., Inc., Dept. C4, 64 Park Place, New York 7, N. Y. Complete information for purchaser and designer is given for all items discussed.
Inform-A-Gram No. B45.

PRECISION CIRCULAR CUTTERS

MEYCO carbide tipped and solid carbide cutters have earned an enviable reputation in plants where long tool life and precision workmanship is a MUST.

These cutters can be furnished in various diameters and thicknesses to meet the requirements of individual applications.

Saws and cutters, both carbide tipped and solid carbide, will aid production and precision in your slotting, venting, slitting and grooving operations . . . and they will be manufactured to your specifications. Please furnish complete specs and quantities desired when requesting prices and indicate material to be cut. MEYCO experience in the manufacture of precision tools, since 1888, is at your disposal.



W. F. MEYERS CO., INC., BEDFORD, INDIANA

Users Of V-Drives will find the new Maurey catalog a useful and convenient source of information on fractional horsepower V-drives, drive parts, and accessories. In the range of fractional to ten HP this 44 page production gives complete information in Maurey products. The section devoted to interchangeable bushings and flexible couplings with shock-absorbing rubber bond are of particular interest. Requests for catalog should either mention this magazine and be made on company letterheads, addressed to Catalog Dept., Maurey Mfg. Corp., 2915 South Wabash Avenue, Chicago 16, Illinois, or be made through our Inform-A-Gram card.
Inform-A-Gram No. B46.

Belt Grinding Attachments just issued by the Buckeye Tool Corp combine for the first time the utility of the abrasive belt with the maneuverability of a portable grinder. The attachments are made in two sizes, and consists of contact wheel, a supporting arm mechanism and an idler pulley that supports and aligns the belt. In extensive field tests, the new units cut production time on many grinding operations which formerly required mounted wheels, abrasive discs, snagging wheels, cones or hand files, and they give an excellent finish, entirely free from lap, gouge or chatter marks. The attachments are designed for Buckeye horizontal grinders, but may be adapted to other makes of the proper type and speed. Copies of descriptive folder from Buckeye Tools Corporation, Div. 16, P.O. Box 966, Dayton 1, Ohio.
Inform-A-Gram No. B47.

Resetting And Sharpening Of Power Hack Saw Blades made of tungsten, high speed steel, or molybdenum is performed by R. B. Tool Co., Inc., 41 E. Hartsdale Ave., Hartsdale N. Y. Write for literature with service details.
Inform-A-Gram No. B48.

Drop, Press, And Upset Forgings, cold stamping, heat treating and quality control are among the services described in bulletin 5201 from Pittsburgh Forgings Co., Coraopolis, Pennsylvania. The bulletin is attractively printed in two colors, and reviews the company's skills and tools for contract work for industry. A section devoted to closed die interchangeable duplicate forgings is especially interesting. The company ranks among the largest producers in this field.
Inform-A-Gram No. B49.

The "Multi-Metal" File is a new addition to the Bite Rite line of files made by Henry Disston & Sons, Inc., Dept. TJ, Philadelphia 35, Pa. It is especially designed for the machinist who must work with a variety of metals, and has special tooth shapes and spacings so that it will perform equally well on aluminum, brass, copper, iron, steel, and other metals. The sides of the file are double-cut; the edges single-cut. Multi-metal files combine fast cutting and long life with the absolute minimum of clogging.
Inform-A-Gram No. B50.

Carboloy Thermistors are electronic semi-conductor control units whose electrical resistance responds negatively to minute temperature changes. New 30-page catalog TH-5 contains general basic information on physical and operating characteristics, with specifications, wiring diagrams, and typical applications. Carboloy Dept. of General Electric Company, Detroit 32, Michigan.
Inform-A-Gram No. B51.

Coil Stock Straightening Machines with variable speed are described in a bulletin from F. J. Littell Machine Co., 4197 North Ravenwood Ave., Chicago 13, Ill. Ten models of the Littell series "308" are featured for different stock widths and thicknesses.
Inform-A-Gram No. B52.

Diamond Heavy Duty Engine Lathes are the subject of current literature from the Diamond Machine Tool Company, 3429 E. Olympic Blvd., Los Angeles 23, California. Lathes are precision engineered, with 27 spindle speeds, and 180 longitudinal feeds.
Inform-A-Gram No. B53.

Centralized Lubrication Systems are featured in a new bulletin from Lincoln Engineering Company, 5701 Natural Bridge Avenue, St. Louis 20, Missouri. Bulletin also contains company line of standard lubricant applicators.
Inform-A-Gram No. B54.

"Kemisol A", New Improved Metal Cleaning Solvent. This new preparation is designed to be diluted 100 to 200 times with water, and is an excellent remover of oil and grease. It is neutral, odorless, non-toxic, non-inflammable, and harmless to human skin, and is also non-corrosive. Its use eliminates the need for chlorinated or inflammable solvents now being used to clean aluminum. Write for test sample and information on this new chemical solvent to Wayne Chemical Products Company, Copeland & MORR, Detroit 17, Michigan.
Inform-A-Gram No. B55.

IDEAL

production speed-ups

LIVE CENTERS
Run lathes faster—make deeper cuts. No gouging, burning or spoilage. Highest accuracy. Male, Female and Pipe points. Also Heavy Duty Models.

ELECTRIC ETCHERS
Easy as using a pencil to etch iron, steel or their alloys. Burns smooth, permanent mark. Ends cost and delay of special name plates. Safe, portable—3 models.

DEMAGNETIZERS
Demagnetize tools, punches, dies, drills, work from magnetic chucks. Prolongs tool life. Three models.

ELECTRIC TACHOMETERS
Quick, convenient. Two sizes—2500 and 5000 RPM.

"XPAND-O-LAP"
Self-aligning, self-expanding laps.

Sold Through America's Leading Distributors

FREE CATALOGS

IDEAL INDUSTRIES, Inc.
415) Park. Ave.
Sycamore, Ill.

IDEAL

Please send catalogs on items checked:
☐ LIVE CENTERS ☐ TACHOMETERS
☐ ETCHERS ☐ "XPAND-O-LAP"
☐ DEMAGNETIZERS

Name_____
Company_____
Address_____
City_____ Zone____ State_____

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Enterprise and Organization Streamline Precision Castings Procurement and Finishing

A program to reduce the cost of finishing Precision Investment Castings and supplying them complete to print has been established by The Hitchiner Products Corporation of West Hartford Connecticut. This company was activated primarily to finish the castings of the Hitchiner Manufacturing Co., Inc., of Milford, New Hampshire, and has organized a selected group of job shops to perform the secondary operation on Hitchiner castings.

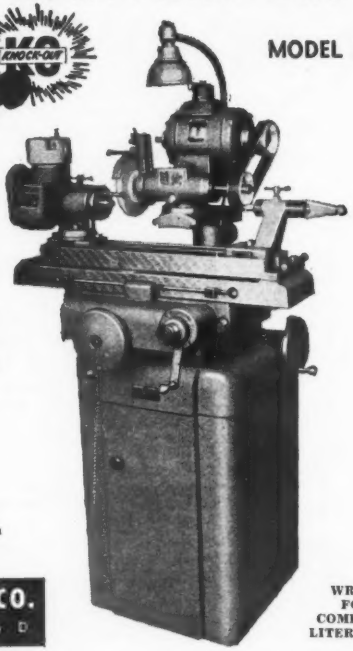
This service according to A. Fred Hitchiner, company president, will eliminate the excessive costs of sub-contracting and handling by making one company responsible for supplying the finished castings. It will mean but one purchase order being placed, one point to contact for expediting and one inspection of the finished castings.

Common to most casting buyers is the problem of finishing castings. While the precision investment casting process, itself, produces intricate parts to reasonably close tolerances, it cannot meet all of today's exacting requirements and additional machining is often necessary. Because these finishing operations are so varied, few foundries are equipped with the necessary machinery for all of these secondary operations. Therefore, the customer must locate sources to handle this finishing work.

According to Mr. Hitchiner, job shops are usually limited in their capacity and their production is often very spotty making it difficult to count on them to handle a job promptly. In many cases, because of the small quantities required, shops are not willing to accept this work. This involves a constant seeking by many buyers for new sources to handle their secondary operations. In arranging for the finishing of the castings the buyer has many exceptionally high overhead costs which the service of this new company hopes to eliminate. These include the time spent in locating and qualifying of job shops to handle subcontract work, the receiving and inspecting of rough castings between operations, the additional expediting and the large amount of paperwork accompanying these operations.

There's a reason 71%
of all popularly-priced Tool and Cutter Grinders
sold in 1951 were "Knock-Outs"

MODEL B860



Will do anything that machines costing 2 or 3 times more will do . . . yes and in less time.

Distributed Only Through Franchise Dealers

K. O. LEE CO.
ABERDEEN, S. D.

WRITE FOR COMPLETE LITERATURE

In order to respond to the need for parts delivered ready for assembly, The Hitchiner Products Corporation organized a group of central Connecticut machine shops and other finishing companies which, according to them, are among the finest in an area known for high caliber precision work. The shops participating in the program were chosen only after they qualified as to management ability, experience of personnel, type and condition of equipment and financial responsibility. The Hitchiner Products Corporation states that it will supply the necessary engineering and inspection supervision and coordinate the scheduling and output of each shop assuring parts meeting specifications and delivery.

The engineering and direct supervision of the program will be under Philip J. McGoohan, Vice President, with many years manufacturing and managerial experience including five years as a Procurement Officer and Lieutenant Colonel in the United States Ordnance Department.

In order to balance the production of the job shops and eliminate the peaks and valleys, the company program will also include the machining of other types of castings and metal parts. They stated that, in addition to Hitchiner castings, they are interested in finely machined parts with close tolerances. Of particular interest are their arrangements to handle small quantities of parts requiring considerable machining which, because of the quantities, are not usually desired by most shops.

★ ★ ★

Henry R. Krueger, Howard J. Snell, and Ezra H. Frye have formed Drillunit Inc., 3784 E. Fort, Detroit 7, for the leasing of equipment and machinery.

New Compound Removes Fingerprints From Metal

A new compound has been developed by a leading oil company, eliminating the problem of a close tolerance product becoming useless or inoperative due to very slight corrosion or heavy staining following handling.

The compound contains a highly effective and potent rust preventative. It may be applied to steel, brass, copper, cadmium, magnesium, zinc, and other metal surfaces by dipping; flooding, or spraying. Precision parts or surfaces wet with cutting or grinding compounds are cleaned and protected by the compound, and after perspiration residues have been removed by dissolution, further contamination is prevented by establishing a rust and corrosive protective film. When the part is required, any petroleum solvent will readily remove the solvent.

VISUAL GRIND
Now a Veteran...
Tested, Proven Successful—
IN MANY PRODUCTION PLANTS!
Continuous inspection unites with blind, straight-through and templet grinding by projection during the grinding period. This complete speedy machine handles a wider range of work than ever before. Difficult jobs in steel and tungsten carbide which required several machines are dispatched with ease and profit on Visual-Grind. Tolerances and accuracy are progressively controlled by visual reference. A precision optic system gives trueness and definition. Husky construction insures rigidity and long life.
Ask for Bulletin No. T-8.
VISUAL GRIND
THE CLEVELAND GRINDING MACHINE CO.
1643 EDDY ROAD - CLEVELAND 12, OHIO

Machine Tool Lubrication*

by J. R. Keen
King Machine Tool Division
American Steel Foundries
Cincinnati 29, Ohio

The purchase of a machine tool from a reputable manufacturer insures against failure of machine function from the standpoint of design, material and workmanship. However, interruption of production due to faulty lubrication is often overlooked by the purchaser as a possible hazard.

The machine tool manufacturer has discharged his responsibility in this respect when he makes provisions for an adequate MEANS of lubrication, and furnishes detailed instructions outlining the type, grade, and quality of the various lubricants and the proper location and frequency of their application. How closely these instructions are followed is dependent entirely upon the new owner's attitude toward the problem of successful machine tool lubrication.

Very often the purchaser of a machine tool will be so interested in getting the machine into production that the machine will be started up and operated without even its initial lubrication which is normally checked by the service engineer who should have been called upon to start up the new equipment.

Sometimes the customer will use cleaning compounds to remove rust inhibitors from the machine and then endeavor to move large heavy slides before any lubrication has been applied to these cleaned bearing surfaces.

A better understanding of this problem can best be obtained by reviewing the development of the present day, highly productive machine tool. This development can be divided into three distinct phases, corresponding roughly to industry.

During the first phase, carbon steel tools then in common use necessitated relatively low spindle speeds. Power was supplied to the machine by means of leather belting from overhead line-shaft-

*Contributed by the Machine Design Division for presentation at the Semi-Annual Meeting of The American Society of Mechanical Engineers, Cincinnati, Ohio, June 15-19, 1952. Presented here by courtesy of the Society.

CUT OFF TO ACCURATE LENGTH
AND
Stop
Scrap!
Triple-Chip Saw Blade
The MOTCH & MERRYWEATHER
is
the Way to That End
Segmental blade illustrated.
Don't be guilty of wasting metal. Cut off all shapes and sizes of ferrous and non-ferrous metals to accurate lengths. Segmental blades for large stock; solid blades for smaller. Let your local M. & M. dealer show the way to less waste.
Get bulletins from us or your local dealer.
THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING CLEVELAND 13, OHIO
COMMAND OUR UNPARALLELED EXPERIENCE IN CIRCULAR SAWING
MMM

ing, counter-shafts and cone drives. Spindle bearings were usually plain bronze boxes lubricated by sight-feed oilers. The most common provision for lubrication of secondary bearings consisted of a small drilled hole carrying oil to a plain bronze bushing. Due to metallurgical limitations, large bearing areas were necessary to keep bearing pressure to an absolute minimum. Grease cups were sometimes used to carry grease to a slow speed bearing, and no oil seals or retainers were provided to prevent the loss of lubricant or the entrance of foreign matter.

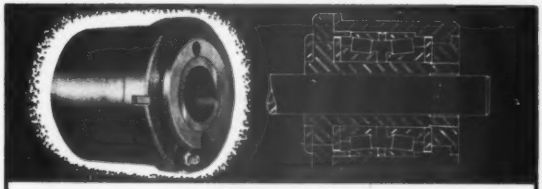
One might properly ask how could these machines be operated successfully for many years with so many obvious lubrication faults? The answer lies in the basic slow speed operation of the machines, the frequency of lubrication and the fact that they were operated by experienced master machinist who knew how to care for mechanical equipment.

The second phase of machine tool development coincides with the general adoption of high speed steel cutting tools. As these tools permitted considerably higher spindle speeds and proportionately greater stock removal, proper lubrication became a serious problem.

Machine tool builders were soon called upon to supply individual motor drives to all new machine tools. Step pulleys and countershafts thus being ruled out of the picture, spindle speed changes were arranged by means of a gear train enclosed within a gear box or headstock. Higher spindle speeds resulted in the widespread adoption of anti-friction bearings for spindles and other shafts in the gear train and their lubrication by means of an oil bath was found both convenient and adequate.

The increased tool pressure possible with high speed cutting tools resulted in rapid wear of the cast iron bed ways, and it was found necessary to increase the bearing areas. This in turn called for much greater attention to proper oil grooving and larger fixed reservoirs.

Machine tool builders, confronted with serious galling of way surfaces, began to experiment with various types and kinds of hardened ways, either by applying strips of hardened steel to the cast iron bed or flame hardening the cast iron way itself. Lubrication engineers, working closely with machine tool designers, developed special purpose lubricants for specific applications, as it was obvious



THE ONLY PILOT BEARING BUSHING WITH ABSOLUTE SEAL AGAINST COOLANT AND GRIT!

True—absolutely true—the Jergens Pilot Bushing provides complete sealing against abrasive grits and dust or other damaging materials entering into the roller bearing cavity. Amazing as it seems the entry of grit into the outer seal actually increases the effectiveness of the seal. Furthermore, this revolutionary bushing provides greater bearing accuracy—bushing stability and the first long lasting, complete seal in the roller bearing field.

SEND FOR CATALOG No. TP-8

PERFORMANCE FEATURES

* Absolute seal against coolants, grit and dust
* Bearings can be dissembled without removing housing
* Cartridge - type bearing holder provides greater accuracy
* Protects against thrust loads as well as radial
* Tapered bearings can be adjusted to compensate for wear
* Adaptable to receive removable slip bushings
* Adaptable to receive keys or keyways
* Can be furnished with shafts to use as pressure rolls

J. G. JERGENS CO.
11106 AVON AVE • CLEVELAND 5, OHIO

that no one type of oil or grease would be suitable for high speed spindles the extreme pressures and wiping contact of worm gearing, and the high unit pressure of various slides and saddles.

It was soon found, however, that the specifying of all these lubricants had its drawbacks from the practical side. Few shops had recognized the importance of establishing a Lubrication Department with a certain individual, or individuals, responsible for the proper lubrication of all machine tools, and, as a consequence, numerous bearing failures occurred due to the outright neglect of periodic lubrication, or to the more easily excusable reason that the wrong lubricant was applied to the wrong fitting.

In an endeavor to simplify this problem, machine designers experimented with various means of ONE SHOT lubrication, compromising design for the expediency of using one type of oil for the majority of lubrication points. On certain machine tools with a larger number of high speed rotating shafts, and no highly loaded reciprocating slides this ONE SHOT system proved highly successful and is in common use at the present time. In the great majority of cases, however, this over simplification did not prove too successful due to the widely divergent requirements for lubrication present in even the most simplified design.

The third phase of machine tool development evolved from the general usage of cemented carbide cutting tools. These tools permitted spindle speeds up to 6 times those possible with high speed steel, with a corresponding increase in horsepower requirements. Machine tool builders soon found that their machines were too light, underpowered and inadequately lubricated to exploit the advantages of carbide tooling to its fullest extent. Complete redesign of the entire machine was often the only solution.

Tremendous advances were made in the speed, operating ease, efficiency and productivity of machine tools. In the meantime, small highly efficient, hydraulic pumps became available along with every conceivable type of valve, flow control and metering device.

In the new designs above mentioned, full use was made of these new hydraulic components. Hydraulic traverse to large, heavy tables, fine feeding movements to tool carrying slides and remote actuation of driving clutches became commonplace.

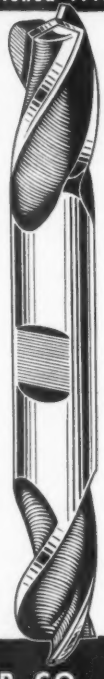
Due to the fact that the simple, high speed, hydraulic pumps depended upon

ARROW TOOL & REAMER CO., Established 1916

ARROW
END MILLS
A COMPLETE LINE

Arrow's engineering skill and production experience gained during 36 years as a major supplier of precision tooling is your assurance of custom quality, prompt service and superior performance.

Write today for details on Arrow's simplified fast service on "Specials"



ARROW TOOL & REAMER CO.
418-422 LIVERNOIS AVE. • DETROIT 9, MICH.

a good quality turbine oil for self-lubrication as well as the hydraulic medium, machine tool designers were quick to utilize this oil pressure as a means of lubricating various bearings. This was particularly helpful in headstock gear trains and spindle bearing applications as the oil bath means of lubrication caused the overlubrication of the new high speed antifriction bearings. The resultant foaming of the oil caused destructive temperature rises in these precision bearing applications.

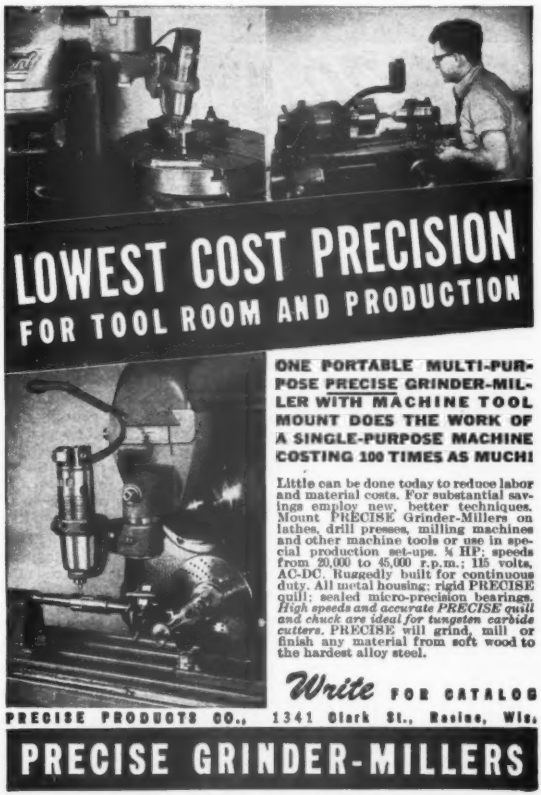
The development of cartridge type oil seals to contain oil under pressure was a great step forward; however these oil seals would often eat into and burn up a rapidly rotating shaft. It was puzzling to see a relatively soft composition seal wear deep grooves into a hardened shaft; however, it was found that minute particles of metal loosened during grinding, would imbed themselves into the composition seal and in turn wear the shaft. This problem was finally solved by superfinishing the oil seal surface of the shaft.

Modern machine tools are now provided with automatic means of supplying metered amounts of oil to slides and carriages by interlocking the lubricating plunger with the levers or controls actuating the slide movement. This system has proved satisfactory and has resulted in nearly ideal lubrication conditions without the danger of overlubrication.

Take the turret saddle of a turret lathe, for example: where different machine setups call for varying frequency of use of the saddle. By inter-locking the means of lubrication with the saddle traverse lever, no lubrication is supplied until the saddle is called upon to move; yet each time the saddle does move a metered amount of oil is supplied to the ways.

Most mass production industries with automatic or semi-automatic machine tools have been forced to install lubrication departments staffed with specialists in the art of lubrication who carry on a periodic lubrication schedule of each machine in the plant, using the correct oils for each specified application. This is due to the fact that these industries hire machine operators who know little or nothing about mechanisms more complicated than a crow-bar.

These lubrication departments more than pay for themselves in protection of the plants' capital assets and in prevention of production tie-ups necessitated


LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION
ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!
Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¾ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters. PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.
Write FOR CATALOG
PRECISE PRODUCTS CO., 1341 Clark St., Racine, Wis.
PRECISE GRINDER-MILLERS

by replacement of burned up and improperly lubricated machine parts. Smaller shops usually employ a higher class of machine operator or machinist who is more familiar with the proper maintenance of machine tools and thus the need for a specialized lubrication department is not nearly so critical but is still very desirable.

All machine tool designers are aware of the importance of adequate lubrication and will oftimes adopt a design incorporating expensive rifle drilling operations, thereby greatly increasing the cost of the machine part, merely to insure a continuous and adequate supply of lubrication. Examine any modern machine tool with a critical eye for lubrication provisions, and you will find numerous labyrinths, oil seals, felt and neoprene wipers, bellows type rubber boots, oil slingers, distribution manifolds, elaborate oil grooving, oil level gauges, and, last but not least, adequate oil filters.

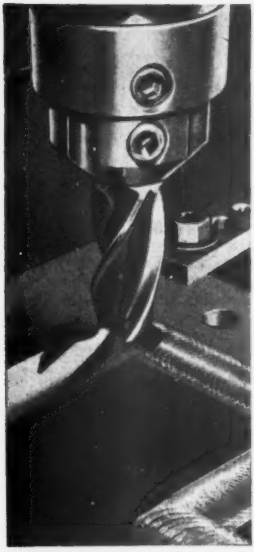
Our service files are filled with classic examples of machine tools being ruined by improper lubrication in the customer's plant.

If all machine tool users would insist on a definite lubrication program, following the machine tool builders' charts and recommendations, would establish and maintain a segregated area for the storage of lubricants and the prevention of their contamination, there would be no such thing as a lubrication problem.

YESTERDAY'S PIONEER . . . TODAY'S LEADER

NEW HEAVY DUTY END MILLS and HOLDERS

(Both are Stock Items)



● Look at this rugged 2" diameter Weldon end mill with 4" long flutes which made a 2½" deep cut in a solid block of die steel—4140 steel heat treated to 260 Brinnell. The feed was 1½" per minute, and the material was removed at a rate of 7½ cubic inches per minute.

This HEAVY DUTY Weldon end mill is held by a new-style end mill holder which bolts securely on to the nose of the milling machine spindle. The holder, located by a centering plug, is driven by two drive keys on the spindle nose. The 2" diameter shanks of these heavy-duty end mills are securely held by two large hollow head screws.

For top performance and sturdy long life in end mills—large or small—look to Weldon.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

SEND FOR LATEST CATALOG NO. 10

THE WELDON TOOL CO. Cleveland 4, Ohio

3000 WOODHILL ROAD

★ ★ ★

King's 50 Years

"King Machine Tool" of Cincinnati, Ohio, manufacturers of the King Vertical Boring & Turning Machines, celebrates its Golden Anniversary.

Founded by Rufus King in 1901, the business was originally incorporated as the Wais-King Tool Company. Three years later, when E. A. Muller joined the organization as Vice-President and General Manager, the corporate name was changed to The King Machine Tool Company, and so remained for forty-four years—until 1948, when it was acquired by American Steel Foundries.

Under the able guidance of E. A. Muller, assisted in later years by his son, C. F. Muller, who succeeded to the presidency upon his father's retirement in 1943, the enterprise continued to grow.

When, in 1948, the King business was acquired by American Steel Foundries, it had already been utilizing for several years the increased facilities of its present ultra-modern home at 1150 Tennessee Avenue. Known as the King Machine Tool Division of American Steel Foundries, the enterprise is conducted under the progressive leadership of Charles F. Elmes, a Vice-President of the parent company and General Manager of the King Division.

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

Apprenticeship and Selective Service

W. F. Patterson, director of the U. S. Department of Labor's Bureau of Apprenticeship, recently announced that the facilities of the Bureau's field office are being made available to sponsors of apprentice training programs who wish to certify their programs under the recent Presidential order authorizing requests for the deferment of apprentices who meet Selective Service regulations.

In offering the services of the Bureau of Apprenticeship in preparing and processing sponsors' requests for certification, Director Patterson said that the purpose of the order is "not only to maintain and increase the ranks of skilled workers needed in our extensive defense program, but to maintain a sound civilian economy."

In requesting acceptance of apprentice training programs for deferment purposes, sponsor must make application to their respective State Directors of Selective Service, certifying that their programs conform to all Selective Service requirements and standards governing the deferment order. Forms for requesting acceptance, together with assistance in processing requests, may be had from field representatives of the Bureau of Apprenticeship, from representatives of State apprenticeship agencies, or from State Directors Of Selective Service by those sponsors whose programs qualify under the deferment order.

To be eligible for acceptance, apprenticeship training programs must, among other requirements, have been in existence for at least one year; one or more apprentices must have been continuously employed during this time in each occupation for which request is made; and the occupations in which they have been employed must conform to requirements for apprenticeable occupations prescribed in the order.

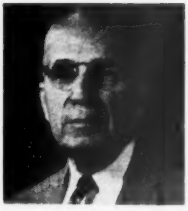
Sponsors of programs registered with the Bureau of Apprenticeship of the U. S. Department of Labor must submit requests for deferment on certificates available from Bureau of Apprenticeship field representatives authorized to certify their programs.

Forms for requesting acceptance of unregistered apprentice training programs may be obtained by sponsors of such programs from any of the previous sources. With his request, the sponsor of an unregistered program must submit to the State Selective Service Director either a copy of his apprentice training program or a detailed description of it. At the request of sponsors, field representatives will advise regarding procedure. In requesting individual apprentice deferments within an approved program, sponsors must make application to the registrants local Selective Service Board, certifying that the man is meeting all standards and requirements of the apprenticeship training program, and that he has completed the required number of hours of on-the-job training together with related trade instruction.

GREATEST COST SAVER
IN
METAL CUTTING
Cutting Hard-Tempered
1/8" Chrome Moley Steel
Sawing 16" Steel Piling
FRICTION sawing with Tannewitz High Speed Band Saws results in perfectly amazing time savings in the cutting of flat sheets of soft or hardened steels, non-ferrous metals, armor plate, glass, plastics, many other materials and the trimming of castings. For cutting formed parts there's nothing to compare with it. The down-drag of the saw is so negligible that parts may be trimmed or sawn as desired without using a rest of any kind. Whatever your cutting requirements, chances are they can be handled faster and at less cost with Tannewitz High Speed Band Saws.
THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN
Write
for Your
Free Copy
on Friction Sawing
FRICTION
SAWING
with
Tannewitz
HIGH SPEED BAND SAWS

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

MEN YOU SHOULD KNOW . . . . . .



HARRY O. ANDERSON

STANLEY C. JOHNSON

FREDERICK S. BLACKALL

H. K. JOHNSON

40 Years
1912 - 1952
Over this long period we have helped many large and small metal working plants control cutting tool costs through efficient salvaging programs.
Regrinding and rebuilding of HSS and carbide tools.
We manufacture carbide drills and center drills for cutting hardened steel.
Representatives in all industrial areas.
National TOOL SALVAGE CO.
6511 Epworth Detroit 10, Mich.

★

Harry O. Anderson retired from his position as chief abrasive inspector for Norton Company on July 1st. He completed fifty years service with the company, during which time he contributed very greatly towards the progress of the abrasive industry.

★

Stanley C. Johnson replaces Mr. Anderson as chief abrasive inspector for Norton. He has been with the company since 1947, and worked for nearly a year in each of the abrasive inspection, manufacturing control, quality control and grading departments before becoming assistant to the chief abrasive inspector in late 1950.

★

The nomination of **Frederick S. Blackall, Jr.**, president and treasurer of the Taft-Pierce Mfg. Company, as the president for 1953 of the American Society of Mechanical Engineers was announced on June 23rd. Mr. Blackall heads a slate of new ASME nominees, who were recently submitted by the society's nominating committee.

★

H. K. Johnson has recently been named controller of the Canton, Ohio, division of the E. W. Bliss Company. Mr. Johnson succeeds F. J. DeLorme, who has ben appointed secretary and assistant treasurer.

★

. . . . . MEN YOU SHOULD KNOW

HAROLD BYRON SMITH

AUSTIN E. COLE

ROBERT F. DICK

ROBERT SHANNON

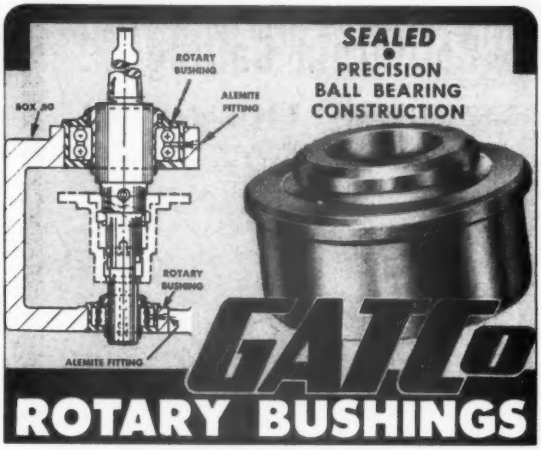
★

As a part of the company's long term program of organization for new growth and marketing opportunities, Harold Byron Smith, president of Illinois Tool Works, Chicago, has announced the election of Austin E. Cole as vice president and treasurer, J. B. O'Connor as vice president and manager of new product development, and Robert F. Dick as vice president and assistant to the treasurer. Eugene W. Fuller will continue as vice president and manager of Shakeproof Inc., a division of Illinois Tool Works. J. F. Miller remains vice president and manager of the Tool and Machine Division. Others elected as part of the new organization structure are Bernard H. Regenburg, secretary, and J. R. Russell, assistant secretary and assistant treasurer.

★

Robert Shannon has been named manager of the Hastings, Michigan, division of the E. W. Bliss Co., manufacturers of mechanical and hydraulic presses, rolling mills and special machinery. Mr. Shannon has been associated with the Hastings division for many years, most recently as assistant plant manager. This division manufactures presses of many types with capacities up to two hundred tons.

★



FOR DRILLING, CORE DRILLING, ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.

42330 ANN ARBOR ROAD, U.S. 12, PLYMOUTH, MICH.
Telephone PLYMOUTH 1472

MEN YOU SHOULD KNOW . . . . . .

CHARLES REIFF

BERNARD LAST

WILLIAM SIPPRELL

ROBERT N. NELSON

California Calling . . .

ENGINEERS

A better job, a better life, a better future can be yours in California—at Lockheed Aircraft Corporation.

On the job, you enjoy increased pay; fine, modern working conditions; association with top men in your profession—men who have helped build Lockheed's reputation for leadership.

Off the job, you live in a climate beyond compare—where outdoor living can be enjoyed the year around.

In addition, Lockheed's production rate and backlog of orders—for commercial as well as military aircraft—insures your future.

To engineers in non-aeronautical fields. The step up to Aircraft Engineering isn't as steep as you might expect. Aircraft experience isn't necessary. Lockheed takes your experience, your knowledge of engineering principles, your aptitude and adapts them to aircraft work in its Engineer Training Center.

You learn to work with closer tolerances. You become more weight-conscious. You may attend classes in the Training Center for three days—or six weeks. It depends on your background. But, always, you learn at full pay.

Mr. M. V. Mattson, Employment Manager, Dept. TP-8

LOCKHEED AIRCRAFT CORPORATION
BURBANK, CALIFORNIA

Dear Sir: Please send me your brochure describing life and work at Lockheed.

My name _____

My address _____

My city and state _____

My occupation (type of engineer) _____

★

Rockwell Manufacturing Company has announced the appointment of Charles C. Reiff as chief engineer of the Barberton division, Barberton, Ohio. Bernard Last will succeed him as project engineer of the lubrication department at Rockwell's home office in Pittsburgh. Mr. Reiff joined Rockwell in 1950 as a design engineer, and in his new position will be responsible for the engineering and manufacture of Nordstrom valves. Mr. Last, a design engineer, also joined Rockwell in 1950. His new responsibility covers the development of such lubricating equipment as grease guns, bucket pumps, fittings, etc., suitable for handling all Nordstrom valve lubricants.

★

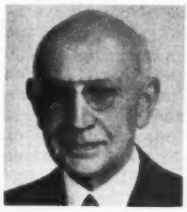
William A. Sipprell, Jr., chairman of the board of directors and president of H. & B. American Machine Co., of Pawtucket, R. I., became president of Cleveland Welding Company, Cleveland, Ohio, on July 1st. Mr. Sipprell joined the company as chairman of the board of drectors in 1946, and was elected president three years later.

★

Robert N. Nelson, formerly assistant sales manager, has been promoted to sales manager of the Pneumatic division Sundstrand Machine Tool Company. Mr. Nelson became affiliated with Sundstrand as sales engineer in 1946.

★

. . . . . MEN YOU SHOULD KNOW



D. G. CLARK

WILLIAM KALB

LESTER A. SHEA

HARVEY O. EDSON

★

D. G. Clark has been appointed assistant general sales manager of Firth Sterling Inc. His association with the company began in 1903 at the Chicago branch. In 1919 he served as Eastern sales manager, and in 1927 went to the main Pennsylvania plant as director of sales of the steel division. In 1946 he retired from active management, but returned to the company in 1950 as steel sales manager.

★

E. William Kalb has been appointed steel sales manager of Firth Sterling Inc. He was formerly assistant manager of the steel sales division. His experience in the tool steel industry has covered tool steel, stainless, and alloy steel specialties. He has a B. S. degree in chemistry, and majored in sales administration at Northwestern University.

★

Lester A. Shea, on leave of absence as general sales manager of Lindberg Eng'g Co., Chicago, has been selected Chief, Industrial Heating Equipment Section, Metalworking Equipment Division of the National Production Authority (N.P.A.).

★

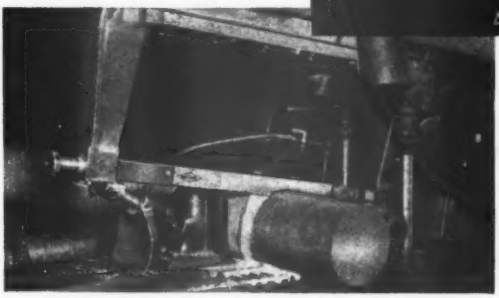
Harvey O. Edson has been appointed controller of Illinois Tool Works. His offices will be located in the company's Chicago plant. Before his association with the company he was active as a public accoontant.

★

BARNES GIVES YOU THE BEST IN POWER BLADES

BARNES

"LOOK FOR THE DIAMOND"



Every Barnes Power Hack Saw blade is individually Rockwell tested to assure you the fine quality for which Barnes blades are famous.

Your Industrial Distributor will help you select the best blade for your job.

BARNES

ESTABLISHED 1919

W. O. BARNES CO., INC.

1297 TERMINAL AVE. DETROIT 14, MICH.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Copper for the Horseless Carriage

by **Bertram B. Caddle**
Secretary
Copper & Brass Research Association

Because of the shortage of copper during the latter part of 1951 the National Production Authority and other governmental agencies urged various manufacturers through Industry Advisory Committees and publicity releases to substitute aluminum and other metals for copper, the oldest of the metals of commerce. From the invention of the first automobile until now copper has been used exclusively for radiators and other important parts of the horseless carriage.

The confusion caused by these governmental rumors of a great copper shortage resulted in the manufacturers of some automobiles to substitute aluminum for copper radiators. Within a few months of service these radiators failed and it was necessary for the manufacturers of the automobile to replace the radiators with copper at a cost of millions of dollars. Despite this expense the substitutions were made, many of the cars having been exported to other countries.

To clarify the confusion caused by the rumors of a copper shortage which some government authorities predicted would extend over a period of years the Copper & Brass Research Association devoted the May, 1952 issue of the *Copper & Brass Bulletin* to pointing out the true facts: that there was no danger of a great copper shortage over the immediate years to come.

The August issue of the *Copper & Brass Bulletin* will feature copper radiation now once again being exclusively used by all automotive and truck manufacturers.

Zagar 5-C pull type collet
Hold on, there!
there's nothing better than a good watch-dog
Zagar 2" holding fixture
Zagar 1" indexing fixture
Depend upon
Zagar FIXTURES, too!
When all is said, this is the first, middle and last consideration — that fixtures, holding and indexing, must HOLD. On that score, Zagars have qualified famously for years — in simple and intricate machining operations. Accurate construction gives accurate performance. Zagar also has a complete line of air-operated holding fixtures and collet lathe chucks. Prompt deliveries NOW!
Write for Engineering Manual T-10 ▶
ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, O.
Zagar
TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Cooperation Award

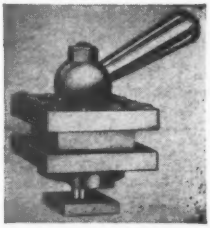
For furnishing technical assistance to the peoples of the Marshall Plan Countries, the Gray Iron Founders Society, national trade association for the gray iron foundry industry, was awarded a Certificate of Cooperation from the Economic Cooperation Administration.

This special recognition was given to the Society for the role it has played in supporting mutual American and European efforts to strengthen the free nations against communism. The Gray Iron Founders Society is presently assisting a delegation of foundrymen from Portugal, visiting this country to see how modern techniques are geared for best production.

CALL Sid Tool COMPANY "HARD TO FIND TOOLS FOR STOCK DELIVERY"

ROYAL TOOL POST TURRETS

WITH 12 POSITION INDEXING



Permit work to be done on ordinary lathes that ordinarily requires a turret lathe. Exceptionally flexible . . . Dependable accuracy maintained in every re-indexed position. Protected against dirt and metal chips. All working parts hardened and rust-proofed. Heavy-duty steel construction.

Made in complete size range, 3 models; Finger-tip control; 3 working positions for each tool; Indexing in one complete unit. Fully guaranteed!

Dimensions Model No.	Tool Block Specifications	Tool Size Range	Approx. Lathe Swing	Shipping Weight	Price Each
250	4 tool, 12 position 2½" sq. x 1⅝" thick	¼" to ⅜"	Bench Lathes	3½ lbs.	$27.50
350	4 tool, 12 position 3½" sq. x 1¾" thick	⅜" to ½"	10" to 13"	8 lbs.	39.50
450	4 tool, 12 position 4½" sq. x 2¼" thick	½" to ¾"	13" to 16"	15½ lbs.	59.00

Model 250 available from stock ready for immediate use on Atlas, South Bend and Logan Lathes. Turrets available with a machineable base.

HIGH SPEED CORNER ROUNDING END MILLS

For use in milling rounded corners, etc. They are of the form relieved type and can be sharpened many times without changing the form.

Radius	Diam. of Shank	Largest Diam.	Whole Length	Net Price Each
1/16	3/8	7/16	2-1/2	$ 6.66
3/32	3/8	1/2	2-1/2	6.99
1/8	1/2	5/8	3	8.63
5/32	1/2	3/4	3	9.61
3/16	3/4	7/8	3-1/8	11.03
1/4	3/4	1	3-1/4	12.01
5/16	7/8	1-1/8	3-1/2	14.09
3/8	7/8	1-1/4	3-3/4	16.28

DOVETAIL CUTTERS

Shank Type — High Speed Steel

Designed to take the place of arbor type and threaded hole angle cutters. Advantageous in reducing set-up time. Ease of handling make them the ideal tool for milling dovetails.

45° and 60° angle R. H. cut are standard. Please specify angle.

Cat. No.	Angle	Diam. of Cutter	Width	Diam. of Shank	Over-all Length	Net Price Each
DT-24	45°	¾	5/16	3/8	2⅛	$ 7.19
DT-44	45°	1⅝	9/16	5/8	2⅞	10.57
DT-24A	60°	¾	5/16	3/8	2⅛	7.19
DT-44A	60°	1⅝	9/16	5/8	2⅞	10.57

• Are you on our monthly mailing list? Write us today!

SID TOOL COMPANY, INC.
CUTTING TOOL SPECIALISTS
126 LAFAYETTE STREET • NEW YORK 13, N. Y.
PHONE: BE 3-4270

Circle postage-free Inform-A-Gram Key Number for your request.

Handy Information On Industrial Power Springs is offered in this new catalog sheet from Sandsteel Spring Division, Sandvik Steel Inc., 145 Hudson Street, New York 13, N. Y. Titled "Sandsteel Springs For Your Products", it describes the three "qualities" of steel

springs; spiral, flat reverse tempered, and cross-curved. Features and special advantages of these types are discussed in relation to such products as clocks and clock mechanisms, recording devices, switches and timing devices. In addition to spring illustrations, the sheet shows diagrammatic views of the various "qualities".

Circle Inform-A-Gram No. C1.

"Gaging For Profit" is the title of a new 16mm, full color and sound film with a running time of 38 minutes, which will be issued on loan for one and two day showings to interested manufacturers by Federal Products Corporation, 1144 Eddy Street, Providence 1, R. I. The film includes practically all known modern methods of gaging for the control of dimensional accuracy. Among these are mechanical types or dial indicators and dial gages, electro-mechanical, air, automatic sorting and continuous measuring gages. The value of indicating gages in statistical quality control is briefly demonstrated, together with a new indicating snap gage and indicating micrometer. Gages for continuously measuring bare or insulated wire, and strip material such as steel, are shown, with another gage that automatically controls machines so as to maintain finished material to specified sizes. There are many other important sections.

DoAll Gage Block And Accessories Catalog called "Gage Blocks And Accessories for Modern Measurement Control" has just been published. It includes descriptive matter to explain the importance of measuring with gage blocks and light wave interference bands. A mass of detailed information is set out in a most attractive form, and divided into sections for quick and easy reference. Basis of dimensional measurement; quality requirements, reasons for use of gage blocks, and maintenance of accuracy are but a few of these sections. Bulletin #51-201 from the DoAll Company, 254 N. Laurel Ave., Des Plaines, Illinois.

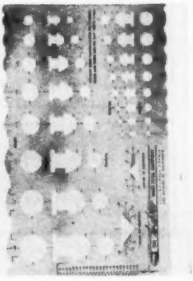
Circle Inform-A-Gram No. C2.

A Phamplet On The Care And Use Of Diamond Tools contains the answers to many problems that are not fully understood in industry. It is available from the Standard Diamond Tool Corporation, 64 West 48th Street, New York 19, New York, and contains the condensed experience of 25 years practice in hundreds of plants where grinding machines are used.

Circle Inform-A-Gram No. C3.

This Rivet Drafting Template was developed as an aid to conserve drafting time in engineering departments. It is 6-⅜"x9-¾" in size, .020" thick, of vinylite tinted in yellow for easy visibility. Complete instructions are printed on the template envelope, showing how to draw Hi-Shear rivets in plan or side views. Rivets may be drawn full or half scale, and proper grip length quickly found. Hi-Shear Rivet Tool Co., 8924 Bellanca Ave., L. A. 45.

Inform-A-Gram No. C4.



Select Faster, More Efficient

PRODUCTION

from the wide range of Brown & Sharpe Cutters

The closer you match your cutters to each job, the faster and more efficiently they will cut.

Brown & Sharpe offers a complete range of cutters that permits accurate selection for each cutting job. Every cutter is a quality product . . . designed to fulfill the enduring accuracy that is built into today's milling machines.

For maximum cutter productivity, specify Brown & Sharpe. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

Brown & Sharpe B·S

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Fast, Accurate Measurements
With the AMIC "Quick-Action"
Vernier Caliper

AT NEW LOW PRICES

The perfect tool for machine shop, tool room inspection and Quality Control. A flick of the thumb and you've got your external and internal dimensions. Knife-edged hardened jaws provide exact thread measurements. A depth gage blade gives speedy measurements. AMIC designed and made exclusively for AMIC by an outstanding European manufacturer.
Scientifically engineered, painstakingly machined, packed in a sturdy leatherette case. A tool without rival.
Size 6" #21B, Graduation 1/40", vernier reading .001.
#22B, Graduation 1/40" and full MM, vernier reading .001 and 1/10 MM.
Write for Circular A. Dealers inquiries invited.

AMERICAN MEASURING INSTRUMENTS CORP.
AMIC BUILDING
21-25 44th Ave., Long Island City, N. Y.
TELEPHONE: EXeter 2-0002

Columbia

TOOL STEELS FOR
All Tools for All Purposes

DIE STEELS
Superdie Atmodie Oildie
Exl-Die EZ-Die

TOOL COLUMBIA STEELS

COLUMBIA TOOL STEEL COMPANY
Main Office & Works
Chicago Hgts. 5, Ill.

Acme Offers Complete Facilities for All Types of
PRECISION GRINDING
FAST SERVICE... EXPERT WORKMANSHIP... LOW COST

- INTERNAL
- EXTERNAL
- CRUSH FORM
- CENTERLESS
- TWIN DISC
- SURFACE
- THREAD

Acme is equipped to handle all types of precision grinding. Expert craftsmen, using newest methods and modern equipment, will do the job for you faster, better, more economically. Acme also offers a flat lapping service that can finish surfaces to within millionths. Write for details.

Acme Industrial Company
Makers of Standardized Jig & Fixture Bushings
200 N. LAFLIN ST. • CHICAGO 7, ILLINOIS

THE SERVICE SHOP TO INDUSTRY FOR MORE THAN 25 YEARS

"Malcomizing" is the name of a process which gives a super-hard finish by the action of nitrogen with steel surfaces. A bulletin from the Lindberg Steel Treating Company, 222 N. Laflin Street, Chicago 7, Illinois, gives comprehensive factual information on the process. Seven different tables are included, among them tables on steel that can be Malcomized, case depths (commercially economic cycles), and mechanical properties of different types of stainless steels. Interesting applications are given where the process has radically cut costs by increased life of parts in production conditions. It is particularly valuable where optimum physical and corrosion resistant properties are required of parts working in close tolerances at high temperature.
Inform-A-Gram No. C5.

Rivet Selector. Selection of the correct rivet for any type of assembly is easily made with the aid of a pocket size rivet selector prepared by Chicago Rivet & Machine Co., 9600 W. Jackson Blvd., Bellwood, Ill. Dialing the selector to any proposed size and discloses the necessary clinch allowance, and recommended assembly hole and rivet head diameters. Steel and brass rivet catalog numbers are also indicated.
Inform-A-Gram No. C6.

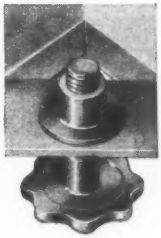
"How to Store Coated Abrasives" is subject of helpful booklet now available. Emphasis is placed on importance of constant relative humidity to prevent deterioration of abrasives. Controlled temperature and circulating air are also discussed. A brief description of Armour abrasive discs, sheets, rolls, and belts is included. Write to ARMOUR AND COMPANY, Coated Abrasives Div'n, Alliance, Ohio.
Inform-A-Gram No. C7.

"Eyelet Setting Data"—an informative 12 page booklet, has just been issued by Edward Segal, 72 Spring Street, New York 12, New York. This handy booklet is believed to be the only publication available on this little known but extremely important subject. In non-technical terms it tells the manufacturer just what eyelets are, how they should be selected and how they can be employed to the best advantage. Eyelet attaching machines are also discussed, and several helpful drawings included.
Inform-A-Gram No. C8.

Porcelain Enamel Industrial Applications are featured in a new booklet from the Erie Enameling Company, Erie, Pa. The booklet contains sections on the types of porcelain enamel, and descriptions of various attainable physical characteristics including abrasion resistance and resistance to high temperature and thermal shock. Lists of typical industrial applications involving each of these characteristics are also included. Basic rules are given which should be followed in designing.
Inform-A-Gram No C9.

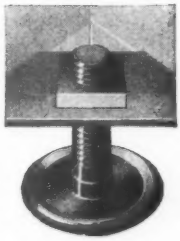
OHIO Adjusting Screws

May Simplify Your Requirements



FS Ohio Screw With WF Projection Welding Nut

Material: Low Carbon Steel



FR Ohio Screw With WS Projection Welding Nut

Thread Sizes: 10-24 to ½-20

Samples and Information About OHIO Adjusting Screws Available to Accredited Concerns

THE OHIO NUT & BOLT COMPANY

19 First Avenue., Berea, Ohio

HOW TO install the statistical method of quality control.. *to reduce costs, and improve product quality*

The statistical method of quality control will enable you to secure the best possible quality assurance from a given inspection cost. This book explains fully the use of this production-line technique in reducing the cost of spoilage and rework.

This partial listing of chapters indicates the scope of this book . . .

—Objectives of Statistical Quality Control

—Some Fundamental Statistical Concepts

—Different Adaptations of the Control Chart for Variables

—Some Fundamentals of the Theory of Probability

—The Control Chart for Defects

—Some Statistical Aspects of Tolerances

—Some Fundamental Concepts in Acceptance Sampling

—Acceptance Sampling by Attributes

—Acceptance Sampling by Variables

—Some Cost Aspects of Quality Decisions

—Organization for Statistical Quality Control

Just Published—New Second Edition

STATISTICAL QUALITY CONTROL

By Eugene L. Grant

Professor of Economics of Engineering, Stanford University

Second Edition, 557 pages, 6x9, 94 illustrations, 19 tables, $6.50

With this industrial tool you can secure top-notch coordination of design, production, personnel, and inspection. This book shows you how to set up an expert system of quality control in your plant with immediate, practical results. Its presentation is geared to manufacturing men who have no previous knowledge of statistics or the mathematics of probability. It is for the engineer in industry, the production and inspection executives, and management men. Concentrating on techniques which have proved to be the most broadly useful and most readily understood and applied, the book demonstrates the value of the control chart in dealing with quality problems in mass production. The book shows how statistical quality control can be applied to any number of departments simultaneously, and indicates through the illustrated examples, something of the wide variety of industries in which it may be applied.

This book is a complete guide to actual techniques of installing statistical quality control

- simple language is used
- explicit directions are given for the use of the various techniques
- 46 case-histories illustrate actual control chart use in specific manufacturing operations
- no special knowledge of statistics or mathematics is required
- many charts, diagrams, graphs, and sample reports illustrate actual details of control chart use
- tables in the back supply valuable working data

HUEBNER PUBLICATIONS, Inc., 1975 Lee Road, Cleveland 18, Ohio

Gentlemen: Please send me at once: AUG-52

☐ copies of Statistical Quality Control by Grant **@$6.50 per copy**

Name .....

Company .....

Street .....

City ..... Zone ..... State .....

☐ Remittance enclosed, ship postpaid.

☐ Purchase order enclosed.

☐ C.O.D. I will pay C.O.D. charges.

Ohio Customers Add 3% Sales Tax

Efficient Materials Handling

Efficient between-operations handling is one key to high production press operation. A "Press-Tender" installation in operation in a press battery has boosted production at least 10%.

On each of the inclined presses, finished parts are ejected by air or mechanical means, and then slide down a metal chute to the "Press-Tender" which conveys them upwards to the next press. They fall into another metal chute leading to a loading point conveniently situated for the operator of the next press.

The Press-Tender is essentially a small, cleated conveyor belt, self-powered and readily adjustable to various loading and unloading heights. It is made in six and eight foot models with 8", 12" and 16" wide, 4-ply cotton belt having cleats 1" high every 24" (or multiple of 24"). The models illustrated are 8'-6" long (center to center of pulleys) and are driven at 72 feet per minute by a 1/1 hp gearhead motor.

While the important gain registered in this installation is naturally the substantial production increase, other advantages more difficult to calculate can nevertheless be seen. Labor saved in the filling, moving, shifting, storage, etc., of tote pans, boxes, and other containers is significant. The elimination of such containers is all-important in keeping floors and aisles clear for increased production. A marked quality improvement is often apparent since there is no risk of parts being mixed or damaged through careless handling. Another essential to efficient production has been achieved in a continuous supply of parts to each press. Each operator's capacity is limited only by his ability to feed the press at a high rate. Proper installation makes possible synchronization of the individual presses, with uninterrupted capacity production.

48-HOUR DELIVERY . . .

ON STANDARD MALE THREAD GAGES

And *most* standard thread plug gages are on our shelves for even *faster* shipment. This includes all sizes, from 0-80 NF to 1½"-6 NC, class 2 and 3, in stock.

How can Perfex maintain quantity stocks of all these popular sizes? It's simple: we've expanded our plant and facilities, added more and more fine thread grinding and checking equipment and increased our force of skilled gage-makers in order to assure you of complete service. Now we're ready to prove the quality of our work and prove it to you today, not in six weeks!

Remember Perfex for your gage needs—thread plugs, thread rings, specials from the smallest up to giants. Perfex is represented in all principal industrial areas; please write for copy of new catalog and name of the Perfex man nearest you. He's as close to you as your telephone.

Perfex also manufactures the "Tangi-Matic" angle-tangent-to-radius wheel dresser.

ACCURACY PERFEX OUR CREED

PERFEX GAGE & TOOL CO.

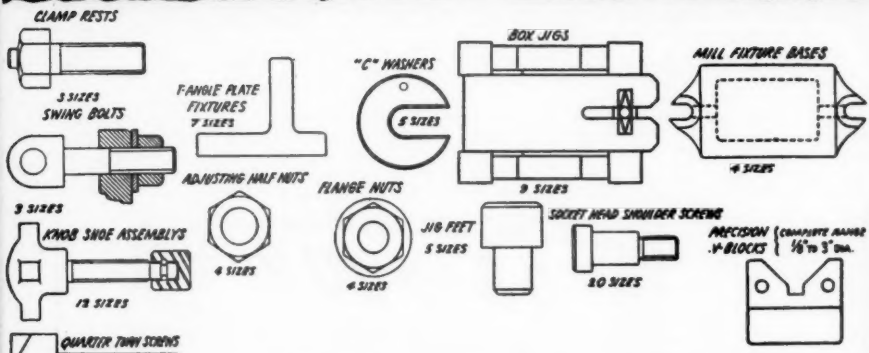
120 Avery Street • Mt. Clemens, Michigan

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

SAVE MAN-HOURS

OF YOUR DESIGNERS AND TOOLMAKERS!

USE NOBLE & STANTON STANDARD JIG AND FIXTURE PARTS



The rush is on . . . manpower shortages are here! Don't waste the valuable time of your designers and toolmakers in custom-building jig and fixture components.

Now is the time to use Noble & Stanton *Standard* Jig and Fixture Parts. Adopt them as standards in your plant. They're the best you can buy—are tough and durable—will never fail on the job—can be used over and over again.

Noble & Stanton Components are precision made from quality steels. NS parts are turned from solid stock—not welded or brazed. They're heat treated and hard chrome plated wherever practicable.

Write today for full information on the Noble & Stanton line of over 300 parts. They cost less than one-third the cost of toolroom manufacture. Tracing sheets are available for every part—saving you design time. Try a few of the items—or stock the whole line!

WRITE FOR CATALOG. *Send today for this free 52-page book of drawings, specifications and prices.*

NOBLE & STANTON, INC.

1002 BROADWAY • BEDFORD, OHIO

TO OBTAIN ADDITIONAL INFORMATION ON:

1. *Products advertised*—get key number from advertisers' index, page 198, and circle corresponding number on INFORM-A-GRAM Card.
2. *Products described editorially*—Circle number of item described on INFORM-A-GRAM Card.

INFORM-A-GRAM ADVERTISEMENTS IN AUG., 1952 Issue

DO NOT USE THIS CARD AFTER OCT. 31, 1952

Name **Title**

Company **Address**

City **Zone** **State**

1	17	32	49	85	106	124	138	153	161E	171A	179A	189A	195B	196M
2	18	33	50	87	107	125	139	155A	163A	171B	179B	189B	195C	196N
3	19	34	51	89	108	126	140	155B	163B	174A	179C	189C	195D	197A
5	20	35	52	91	109	127	141	157A	165A	174B	180A	190	196A	197B
6	22	36	53	92	111	128	142	157B	165B	175A	180B	191A	196B	197C
7	23	38	54	93	113	129	143	157C	167A	175B	180C	191B	196C	197D
8	24	39	55	95	115	130	145	157D	167B	175C	181A	191C	196D	199
9	25	40	56	96	116	131	146A	159A	168A	176A	181B	192	196E	200A
10	26	42	57	97	117	132	146B	159B	168B	176B	183A	193A	196F	200B
12	27	43	58	99	119	133	146C	160	169A	176C	183B	193B	196G	201
13	28	44	60	100	120	134	147	161A	169B	177A	185A	193C	196H	202
14	29	45	79	101	121	135	148	161B	169C	177B	185B	193D	196J	
15	30	46	81	103	122	136	149	161C	169D	178A	188A	194	196K	
16	31	48	83	105	123	137	150	161D	169E	178B	188B	195A	196L	

[ ] Above is new address [ ] I would like to receive TOOLING and PRODUCTION regularly.

INFORM-A-GRAM ADVERTISEMENTS IN AUG., 1952 Issue

DO NOT USE THIS CARD AFTER OCT. 31, 1952

Name **Title**

Company **Address**

City **Zone** **State**

1	17	32	49	85	106	124	138	153	161E	171A	179A	189A	195B	196M
2	18	33	50	87	107	125	139	155A	163A	171B	179B	189B	195C	196N
3	19	34	51	89	108	126	140	155B	163B	174A	179C	189C	195D	197A
5	20	35	52	91	109	127	141	157A	165A	174B	180A	190	196A	197B
6	22	36	53	92	111	128	142	157B	165B	175A	180B	191A	196B	197C
7	23	38	54	93	113	129	143	157C	167A	175B	180C	191B	196C	197D
8	24	39	55	95	115	130	145	157D	167B	175C	181A	191C	196D	199
9	25	40	56	96	116	131	146A	159A	168A	176A	181B	192	196E	200A
10	26	42	57	97	117	132	146B	159B	168B	176B	183A	193A	196F	200B
12	27	43	58	99	119	133	146C	160	169A	176C	183B	193B	196G	201
13	28	44	60	100	120	134	147	161A	169B	177A	185A	193C	196H	202
14	29	45	79	101	121	135	148	161B	169C	177B	185B	193D	196J	
15	30	46	81	103	122	136	149	161C	169D	178A	188A	194	196K	
16	31	48	83	105	123	137	150	161D	169E	178B	188B	195A	196L	

[ ] Above is new address [ ] I would like to receive TOOLING and PRODUCTION regularly.

INFORM-A-GRAM EDITORIAL ITEMS IN AUG., 1952 Issue

DO NOT USE THIS CARD AFTER OCT. 31, 1952

Name **Title**

Company **Address**

City **Zone** **State**

A1	A10	A19	A28	B1	B10	B19	B28	B37	B46	B55	C9	E9	E18
A2	A11	A20	A29	B2	B11	B20	B29	B38	B47	C1	E1	E10	E19
A3	A12	A21	A30	B3	B12	B21	B30	B39	B48	C2	E2	E11	E20
A4	A13	A22	A31	B4	B13	B22	B31	B40	B49	C3	E3	E12	E21
A5	A14	A23	A32	B5	B14	B23	B32	B41	B50	C4	E4	E13	E22
A6	A15	A24	A33	B6	B15	B24	B33	B42	B51	C5	E5	E14	E23
A7	A16	A25	A34	B7	B16	B25	B34	B43	B52	C6	E6	E15	E24
A8	A17	A26	A35	B8	B17	B26	B35	B44	B53	C7	E7	E16	
A9	A18	A27	A36	B9	B18	B27	B36	B45	B54	C8	E8	E17	

[ ] Above is new address [ ] I would like to receive TOOLING and PRODUCTION regularly.

FIRST CLASS
PERMIT No. 7879
Sec. 34.9 P.L.&R.
CLEVELAND, O.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

TOOLING AND PRODUCTION
1975 LEE ROAD
CLEVELAND 18, OHIO

FIRST CLASS
PERMIT No. 7879
Sec. 34.9 P.L.&R.
CLEVELAND, O.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

TOOLING AND PRODUCTION
1975 LEE ROAD
CLEVELAND 18, OHIO

FIRST CLASS
PERMIT No. 7879
Sec. 34.9 P.L.&R.
CLEVELAND, O.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

TOOLING AND PRODUCTION
1975 LEE ROAD
CLEVELAND 18, OHIO

NEW office copying discovery...

Revolutionary New

APECO Auto-Stat

New, low-cost machine makes photo-exact copies direct from original letters, forms, bids, contracts, invoices, reports, blueprints. Here is the first major advancement in office copying in the last 15 years. Can save up to 80% on your copying jobs! Eliminate retyping, hand copying, checking or outside expensive copying service. The Auto-Stat is the first low-cost machine that makes error-proof, legally-accepted, black-and-white *photo-like* copies—WITHOUT SLOW, MESSY DEVELOPING, FIXING, WASHING OR DRYING. It's fast—only 2 simple steps instead of 12 required by old methods. Makes prints instantly from any originals up to 11" x 17"—whether printed on one or two sides, and any inexperienced clerk can operate it!

So low cost! So compact!

Fits on the corner of a desk or table and is priced within the budget of even the smallest firm. It's portable—just plug in any outlet—and the Auto-Stat is ready for instant operation.

COPIES PEEL APART!
NO developing
NO washing
NO fixing
NO drying
NO trays
NO dark room

Have You Read This New Book?

Here is a really informative, worthwhile, factual report on an important new copying development. New 12-page booklet pictures and tells complete Auto-Stat story—shows how you can use this revolutionary new photo-copy method.

Developed and Manufactured in the U. S. A. by
AMERICAN PHOTOCOPY EQUIPMENT COMPANY

MAIL TODAY!

American Photocopy Equipment Co.
2849 North Clark St., Chicago 14, Ill., Dept TP-81

Please Rush me—without obligation—FREE copy of your new book on Auto-Stat—with full details on this new photocopy method.

*Name*_____
*Firm*_____
*Address*_____
*City*_____ *Zone*____ *State*____

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Cold Forming, from page 82

The press brake is suited to work of greater than average length; the limits of this factor depending upon the distance between housing of a specific press brake. When using the overall die surface, the flange widths permissible will be limited by the depth of the throat; usually 8, 10 and 14 inches being the standard throat clearances.

Where extra wide work is involved, the design of forming should be such that the load is fairly well centered. Also, due to the limited stroke of the press brake, design should be such that the available clearance will permit fast, easy handling. In addition to bending, the press brake can be employed for simple shallow draws, punching or piercing; in the latter two operations, due consideration must be given in the spacing of the holes.

The single action press equipment is used to considerable extent in simple forming operations; usually two or more bending operations being required to complete the form such as is illustrated in Figure 11. Wrinkling which may occur during shrinkage due to forming can be minimized by clamping the flange between the punch and the knockout pad during the final forming. Where a rubber female die and either a metallic or non-metallic male die is employed in a press for the purpose of forming parts, the process is identified to the patented 'Guerin' process. In addition to both the rubber platen and the formblock, special devices such as is illustrated in Figure 12 is used to clamp the web of a part to the surface of the formblock, thus preventing tipping of the blank or bowing of the web due to the forces acting upon the flanges. Thus, such devices as the trap as illustrated in Figure 12e can be used to increase rubber pressures in the forming of narrow, straight or contoured flanges. This pressure is obtained perpendicular to the flange due to the wedging action of the reactor block. Where greater pressures are required, the wedge (Figure 12b), the roller bar Figure 12d), the draw ring (Figure 12f) and the wiper plate (Figure 12c) are employed. The material that is chosen for the form block will be dependent upon expected production needs of the specific part. Thus, masonite is usually used on short runs, whereas, where high production is anticipated, the material is cold rolled steel.

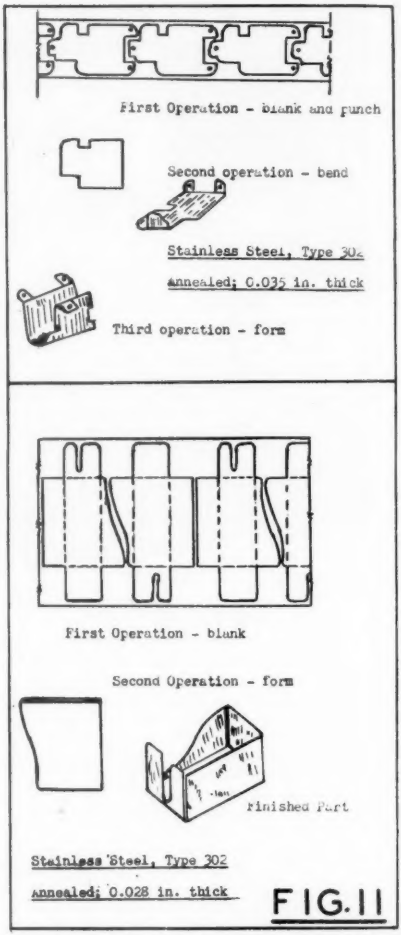
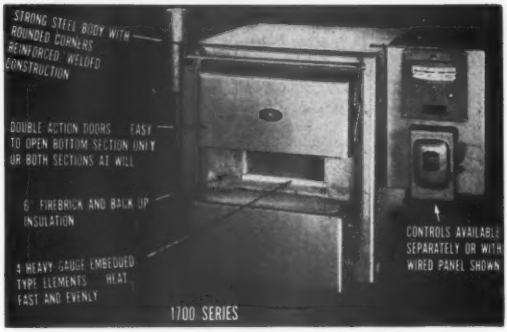


Fig. 11. Typical forming operations performed on single action presses.

In the forming of curved sections or tubing, which have fairly uniform cross-section over a considerable length, a variety of equipment can be employed. Thus, according to Krivobok and Sachs ,

solve heat-treat problems

with versatile Temco bench-type furnace


STRONG STEEL BODY WITH ROUNDED CORNERS REINFORCED WELDED CONSTRUCTION
DOUBLE ACTION DOORS EASY TO OPEN BOTTOM SECTION ONLY OR BOTH SECTIONS AT WILL
6" FIREBRICK AND BACK-UP INSULATION
9 HEAVY GAUGE EMBEDDED TYPE ELEMENTS HEAT FAST AND EVENLY
CONTROLS AVAILABLE SEPARATELY OR WITH WIRED PANEL SHOWN
1700 SERIES

Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy to install and operate, low cost. Priced from $55.00 to $507.50. Write for literature and nearest dealer's name.

TEMCO® **ELECTRIC FURNACES**

THERMO ELECTRIC MANUFACTURING COMPANY, 474 HUFF STREET, DUBUQUE, IOWA

RIMAT DIAL BORE GAGES

FOR PRECISION MEASURMENT OF:

"O" RING GROOVES
SNAP RING GROOVES
THREAD RELIEFS
ETC.

SIZES .300" to 6.000"

THE ORIGINAL INDICATOR GAGE DESIGNED FOR MEASUREMENT OF INTERNAL GROOVE DIAMETERS

For Information Write To

RIMAT TOOL CO., 27 W. Dayton St., Pasadena 2, Calif.

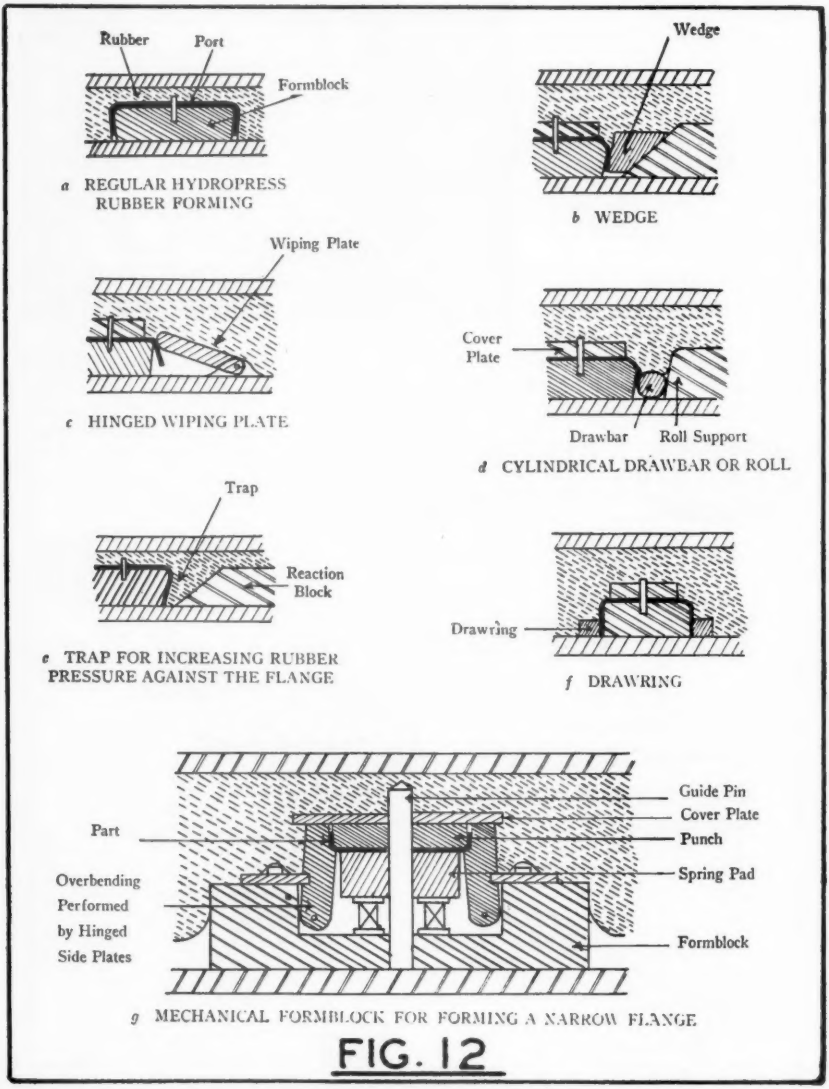


FIG. 12

From "Forming of Austenitic Chromium-Nickel Stainless Steels", Krivobok & Sachs, International Nickel Co

Fig. 12. Rubber forming methods with auxiliary devices for producing more complete bending of flanges.

WHEN ACCURACY COUNTS...
Contact SCHERR!

- OPTICAL PROJECTION DETECTS ERRORS
- HORIZONTAL STAGE: NO CLAMPS NEEDED
- COMFORTABLE INCLINED SCREEN
- MICROMETER CROSS SLIDE ADJUSTMENTS

SEND FOR ILLUSTRATED BULLETIN OR ASK FOR OUR REPRESENTATIVE TO DEMONSTRATE THE "VERTICAL DESIGN" PROJECTOR...

GEORGE SCHERR CO., Inc.
Complete Line of
Precision Instruments
200-T Lafayette St., N. Y. 12, N. Y.

Specify COLONIAL #3

The New Wear-Resistant Drill-Jig-Bushing Steel

•

The simplest way to select drill jig bushings is to use the Colonial "flip-a-page" Catalog B-649

All standard COLONIAL drill jig bushings are now made from Colonial #3—a new oil-hardening steel having many times the wear-resistance of former bushing steels. Also gives greater uniformity.

COLONIAL BUSHINGS INC.
31780 GROESBECK HIGHWAY
FRASER, MICHIGAN

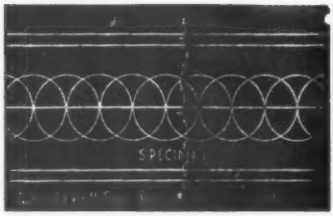
Slash TOOLING COSTS!
Speed up PRODUCTION!
ON SMALL and LARGE PARTS

SPLIT-SECOND CENTERING
POSITIVE CLAMPING
RAPID CHUCKING

Use John's
DRILL JIGS for
Accurate, fast and uniform
DRILLING, TAPPING
MILLING, REAMING
CENTERING, BORING

Vice jaws and bushing plates can be dolled in place to provide any number of permanent jigs.

Write for Details
HEUSER MANUFACTURING CO.
1638 North Paulina St. · Chicago 22, Ill.



DYKEM STEEL BLUE
STOPS LOSSES
making dies and templates

Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information
THE DYKEM COMPANY
2303L North 11th Street • St. Louis, Mo.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Cold Forming, from page 154

these bending methods can be divided into the following sub-types.

'(1) Hand bending and bending by means of presses and hammers are methods in which the forces are usually applied at three definite points with two, but sometimes only one, of the three points being stationary. Thus, a hand bending die can be utilized, or either a power bar bender, press bending die or swivel bending die can be employed.

(2) Roll bending is a method in which the bending is performed progressively, with the rolls usually serving as the means of advance, or feeding. This curvature is obtained by the use of a bull roller, bar type roll bender or by either a three roll, two roll or cam type bender.

(3) Wiper type bender, which is often referred to as wrap forming, is a method in which the section is forced to assume the curvature of a formblock or die by progressively pressing it against the formblock by means of a wiping block, slide block or a roll. This method of bending is usually performed in either the hand bender or the power bender.

(4) Wrapping or wrap forming can be performed by hand, however it is usually done by means of power equipment. It is principally a stretch forming procedure where longitudinal tension is superimposed on the bending moment. These stretch formers are either of the lever and track, rotating cylinders or rotating block type.'

Where variable contours are encountered, either die forming methods or drop hammer forming procedures are employed; these methods usually being more economical than the methods described above for short and broad parts. The material type and condition permissible for contour forming will be dependent upon the design of the formed part, and the specified gage. Normally, the annealed grades of the commonly employed austenitic, ferritic and low carbon martensitic stainless composition can be contoured formed, and, depending upon the design, both the one-quarter and one-half hard austenitic compositions can be employed. The decision as to material formability can only be determined through experimentation.

The forming of contoured parts reinforced by one or more curved flanges are classified either as a stretch, shrink or reversed contour flange. In a stretch flange, a concave curvature is obtained; the shrink flange will realize a convex curvature; and, the reverse contour flange would consist of a combination of both a stretch and shrink flange. Again, both the design and the gage thickness of the stock employed will determine the type stainless and condition that can be employed successfully; the annealed austenitic grades being quite superior in formability provided that the edge has been conditioned by deburring and polishing. The austenitic steels can be provided successfully with stretch flanges [1] when in the one-quarter hard and even one-half hard material. However, as the hardness of the austenitic stainless increases through cold rolling, it must be remembered that the permissible stretch will correspondingly decrease.

Both the brake, single action press and, to some extent, rubber forming procedures are employed in the forming of contoured flanged parts. The first two methods mentioned are most frequently employed. Other methods in obtaining contoured flange parts is by means of spinning on a lathe, roll forming, and, in some instances by drop hammer forming. An important condition to remember in contour flange forming is to design the part with proper dimensions and radii of the flange curvature and to control these radii accurately in the production of the part. Stretch flanging can be performed only to a certain extent without developing radial cracks at the highly stretched edge; the greater the radii of curvature, the greater will be the permissible stretch. In either press die or press rubber forming technique, the commonly used stainless compositions such as types 301, 302, 304, 305, and 308 can be stretched flanged; the permissible percentage of stretch being approximately 40 percent when the material is in the annealed condition. Stainless types 321, 347, 316 and 330 have a permissible stretch value of 30 percent. When both types 301 and 302 stainless are in the quarter-hard condition, this permissible stretch is but 25 percent; whereas, this same material in the half-hard condition has a permissible stretch value of 10 percent. A precaution to observe in stretch

ENGRAVING and MARKING

The Green Engraver

DIAL STENCIL

BARREL DIAL

DIRECTIONAL SIGN

ENGRAVES, ROUTS, PROFILES and MODELS

A real money saver for industry. Proven by the experience of tool and die, electronic machine, radio, electrical and instrument manufacturers.

The Green Engraver zips out precision work on metal, plastics, wood, glass, hard rubber etc. . . . engraves panels, name plates, scales, dials, molds, lenses, instruments, instruction plates, directional signs . . . by simple tracing. *Routing, profiling and three dimensional modeling indicate its versatility.* Electric etching attachment available.

Specify the Green Engraver for the best in low cost performance. Special attachments and engineering service available for production work.

FREE — Fact-packed folder yours upon request.

Green Instrument Co.

380 Putnam Avenue Cambridge, Mass.

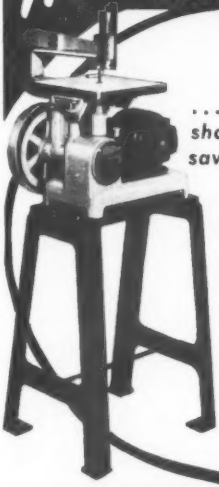
CUT TOOL AND DIE-MAKING COSTS WITH . . .

Milwaukee

DIE FILERS PROFILE GRINDERS

DIE FILERS

. . . for straight-line sharp corner filing, sawing and lapping



This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

Write for illustrated Bulletins and Prices.

PROFILE GRINDERS

. . . for high speed Precision Grinding of curved and Irregular Contours

Standard features include 20,000 or 30,000 R. P. M. spindle speeds, ½ H. P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser. Write for illustrated Bulletins and Prices.

RICE PUMP & MACHINE COMPANY

228 N. 12th Ave. • Grafton, Wisconsin

. . . **Cold Forming, from page 158**

flanging is the edge condition of the blank which should be suitably deburred otherwise a notch effect will be produced on the cold worked edge; this condition being especially true of the austenitic alloys.

A smooth shrink flange is quite difficult to produce in the stainless steels; this problem increasing as both the accuracy and appearance requirements increase. Thus, in many instances, wrinkling or buckling will occur; this tendency increasing as the contour radius and stock thickness decreases and as the width of the flange increases. In many instances, it is necessary to provide cut-outs along the width of the intended shrink flange so as to control the crowding of metal that is likely to occur in this area. Another method of relief is to provide flutes or a forming relief in the formblock for the control of wrinkling. Both these methods are the only ones which will permit the rubber forming of convexly contoured flanges in stainless types 301 and 302 that are quarter-hard. The controlled wrinkling method are generally not used on material exceeding 0.030 inches in thickness in quarter-hard metal.

(To be continued)

References

1. 'Forming of the Austenitic Chromium-Nickel Stainless Steels', V. N. Krivobok and G. Sachs, 1947 ed., The International Nickel Co., Inc., New York.
2. 'Drawing Stainless Steel Milker Pails', W. Ellingboe, The Iron Age, Nov. 11, 1948.
3. 'Drawing Characteristics of Stainless Steels', R. H. Henke, Steel, Sept. 4, 1950.
4. 'Cold Forming Stainless Steels', L. F. Spencer, The Iron Age, March 31 and April 7, 1949.
5. 'The Cold Working of the Stainless Steels', L. F. Spencer, Steel Processing, Aug., Sept., Oct. and Nov. 1950.
6. 'Verson Die Manual', Verson AllSteel Press Co., Chicago, Ill., Bull. DM48.
7. 'Forming Metal Shapes by Cold Rolling', E. J. Vanderploeg, Machinery, Feb., March, May, June and July, 1948.
8. 'Cold Rolled Formed Sections', E. J. Vanderploeg, Product Engineering, Sept. 1949.
9. 'How to Select a Press', Bull. G-47, Verson AllSteel Press Co., Chicago, Ill.
10. 'Plastic Working in Presses', E. V. Crane, 1945 ed., John Wiley & Sons, New York.
11. 'Fabrication of U.S.S. Stainless and Heat Resisting Steels', U. S. Steel Corp., N. Y.
12. 'The Metallurgy of Deep Drawing and Pressing', J. D. Jevons, 1942 ed., John Wiley & Sons, N. Y.
13. 'Resistance to Sensitization of Austenitic Chromium-Nickel Steels of 0.03% Max. Carbon Content', W. O. Binder, C. M. Brown and R. Franks, Transactions Amer. Soc. for Metals, Vol. 41, 1949.
14. 'Bliss Power Press Handbook', E. W. Bliss Co., Toledo, Ohio, 1950 ed.

FOR SALE

We can make immediate delivery from our warehouse of HOT WORK DIE STEEL — TOOL STEEL — SPECIAL STEELS. All standard recognized brand names — guaranteed quality!!

HOT WORK DIE ROUNDS

Size	Trade Name	Weight
7"	Pressuredie ⅋3	77100⅋
5½"	Hot Form	48900⅋
5¼"	"LPD"	3592⅋
5¼"	⅋883 Carpenter	2875⅋
5 3/16"	"HWD"	33600⅋
4½"	Pressuredie ⅋2	4658⅋
4½"	"Shell Die"	16250⅋
4¼"	"HWD"	9000⅋
4⅛"	"Shell Die"	2400⅋
4"	Pressuredie ⅋2	9000⅋
4"	"LPD"	5800⅋
4"	"Chro-Mow"	3100⅋
4"	"H.W.D."	445⅋
4"	Pressuredie ⅋3	455⅋
3⅝"	"Shell Die"	4296⅋
3½"	"Chro-Mow"	28577⅋
3½"	"TCM"	33200⅋
3½"	"LPD"	20000⅋
3½"	"DC-33" Kloster	18700⅋
3½"	"Hot Form"	13100⅋
3½"	Pressuredie ⅋2	11700⅋
3½"	"Shell Die"	8728⅋
3½"	"Air Kool"	1293⅋
3½"	"Fire Die"	1190⅋
2⅝"	"TCM"	1260⅋

HOT WORK DIE SQUARE

8½" x 8½" x 84"	Halcomb ⅋218	40000⅋

TOOL STEEL (WATER H.) ROUNDS

Size	Trade Name	Weight
5¾"	"CFS"	17700⅋
5½"	SAE 1095	2800⅋
5¼"	SAE 1095	1290⅋
4½"	SAE 1095	328⅋
4¼"	"CFS"	6093⅋
3¼"	SAE 1095	385⅋
2¼"	SAE 1095	270⅋
2 1/16	SAE 1095	5700⅋
2"	Vulcan Spec.	8735⅋
1 15/16"	SAE 1095	140⅋
1⅞"	SAE 1095	2100⅋
1 11/16"	SAE 1095	20000⅋
.655"	SAE 1095-CD	28500⅋

TOOL STEEL (OIL H.) ROUNDS

6¼"	"Kelos"	12900⅋
4¼"	CRU.DBL/Spec.	14690⅋
4"	"Vibro"	37300⅋
2"	"K.W." Carpenter	24000⅋
1⅝"	CRU.DBL/Spec.	2140⅋
¾"	"SKF" 711	13400⅋
7/16"	"SKF" 711	1900⅋

OIL HARD SQ. & RECT.

1¾" x 2" x 120"	"SKF 711"	6300⅋
1¾" x 1¾" x 120"	"Atlas 93"	10300⅋

WATER HARD RECT.

1¾" x 1" x 120"	"Silver Star"	33000⅋
1½" x 1" x 120"	"Columbia"	1700⅋

SPECIAL!! **"Magic" Chisel Steel (Jessop)—9/16" RD.—C.D.—45,000⅋**

NOTE: We have large stocks of SAE 1095 (H.R.) Tool Shank Steel in Squares & Rectangles.

GLOBE TRADING COMPANY

1815 FRANKLIN ST. All Phones WO. 1-8277 DETROIT (7), MICHIGAN

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

Confusing but not Amusing

Can't blame the little fellow! Even the best of us are sometimes confused by the many symbols ordinarily used for thousands of ASA Standard sizes. With ACE, however, you simply state your wants in original, unscrambled specifications, i.e.—I.D.—O.D.—Length—Type. That's the way to get just what you order every time. And the way to get your new, free ACE catalog is to write for Catalog No. 1101-9

ACE DRILL BUSHING CO., INC
5407 Fountain Ave.
Los Angeles 29

CUT COSTS ON HOLE-CUTTING WITH

BOREMASTER

Finished holes 1½" to 11¾" diameter to a depth of 8" in one rapid operation on your present equipment with

THE BOREMASTER

Not just another Trepanning Cutter but a real heavy duty tool. Stock removed in one piece eliminating waste.

TIME SAVINGS + MATERIAL SAVINGS = COST SAVINGS
For full details write

KARL A. NEISE
381 Fourth Ave., Dept. TD, New York 16, N. Y.

EISLER JIG BORING — CAM MILLING

A SPECIALIZED ROWBOTTOM CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION ...EXPERIMENTAL DEVELOPMENT

EISLER ENGINEERING CO., INC.
732 S. 13th Street (Avon Ave.)
Newark, N. J.

SEND FOR FREE CATALOG TODAY

T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

QUARTER TURN SCREWS
SHOULDER SCREWS
JIG FEET (3 TYPES)
SPHERICAL WASHERS
LATCH BOLTS
FLANGED NUTS
CUT THREAD STUDS
TEE NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
CAST IRON HAND KNOBS
FIXTURE KEYS
KNURLED HEAD SCREWS

Northwestern
116 HOLLIER AVE., DAYTON 3, OHIO

PRECISION VERNIER CALIPERS

The TUNA Precision Vernier Calipers are made of best Swedish steel with hardened measuring surfaces.

Measuring length	5⅝"	Depth of jaw (internal)	⅝"
Graduated in	.001"	Depth of measurement from	0 to 5⅜"
Depth of jaw (external)	1⅝"	Net weight	5 ounces

HIGH QUALITY • LOW PRICE, $9.75 • IMMEDIATE DELIVERY
Leatherette Case for Calipers, $1.00

SWEDISH GAGE CO. OF AMERICA
C. E. JOHANSSON GAGE CO.—A DIVISION

8900 Alpine Avenue
Detroit 4, Michigan

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Pressed Metal Institute, from page 94
because of two reasons. One is that there have been a lot of problems to overcome. Secondly, in a venture of this type there is a great deal of skepticism. A lot of fellows have tried something like this before, and a lot of confusion exists as to what the thing is all about.

"We are quite interested in placing our machines quite carefully with people who will make good use of them, and so we have just gone very slowly. However, I think we are ready to go. As I say, we have about 14 machines around.

"Incidentally, there are two sizes, principally, one the 12-inch, so-called which is the 875-ton; and the other is 26-inch, which is a 4200 ton. Now any of you who are interested in costs, the small unit is about $60,000, and the 26-inch unit is $165,000. I will take your orders on the way out.

"We also, incidentally, have a larger size in mind, up around 32-inch or 40-inch, and we draw to a depth of about 14 inch maximum."

Mr. Nierenberg commented: "I have been trying to count on my fingers the number of machines we have available throughout the country. I don't think we have 14, but we have something comparable to that, because a number of our machines have not been erected as yet, that is, those that are in the process of being erected now.

"As far as the range of sizes available, we have basically about half a dozen sizes. There are six sizes available. In each size, you have another large range of choice of the size of blank bucket to fit the blank sizes. The largest size press we build is 6500 tons. The smallest is 370 tons."

Question: "What is the cycle of the Hydroform machine, and what is the life so far established of the rubber containing the hydraulic oils?"

Answer: "The cycle on the small machine, for example, is about 200 an hour. When I say "cycle", I mean floor to floor time. That takes in the handling. That would be reduced by the depth of the draw. The capacity of the machine would probably go down to about 150 an hour. The larger machines will, of course, come down to a cycle of 100. The 42 machine would run slower, on an average about 80 to 90 per hour.

"The rubber diaphragm, of course, is always a big question. How long does the diaphragm last? Frankly, we have had them last five minutes, and we have had them last five months.

"The thing we are interested in, of course, right from the beginning, was this question of rubber life and diaphragm life. We have found that it has been reduced to quite a simple thing. It is a question of economics. We have reduced it to this, that if the diaphragm life, for example, on a particular job is three weeks, the cost of that rubber and the cost of installing it has to be added to the cost of tooling that particular job.

"We have some customers—one in particular—who has been running three shifts around the clock. It is really pounding the rubber. In that case he has averaged about two weeks on the life over various shapes and depth of the draw.

"Then we have had cases where four or five months have gone by before a diaphragm change was necessary.

"We have made the change quite simple. In the case of a small machine, we can get one in and out in forty-five minutes. We also protect the diaphragm. Incidentally, the diaphragm is very thin, roughly a quarter of an inch or three-eighths of an inch thick. We have protected it by several layers of rubber, about 1½ inches thick, which is glued on and carried up and down with the ram of the press. Those are disposable and take the real abuse that comes in contact with the work. Again, that will vary according to the gauge of metal, that is, not so much to the shape or conformation as the gauge, but, as you realize, a ⅜ piece of steel will actually present quite a sharp shear to the rubber as compared to a piece of .030 stock."

Question: "You are probably acquainted with the matter of assembly of an artillery shell, where the cartridge case is crimped to the projectile. During the last war I happened to be investigating a method that the Army and Navy were both very interested in, in crimping that cartridge case into the groove of the projectile. That was done by steel dies. A method was suggested and developepd partially, and I spent a lot of time work-

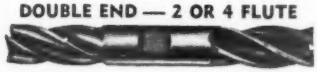
(Continued on page 166)

Victor's Specials Deserve Your Attention!

High Speed S.S. END MILLS

FIRST QUALITY . . . SURPLUS STOCK!

DOUBLE END — 2 OR 4 FLUTE



1/16 to 3/8 by 32nds $2.20
13/32 to 1/2 by 32nds 2.80

ALSO AVAILABLE—2 and 4 Flute up to 2" Diameter Double and Single End!

SINGLE END — 2 FLUTE

1/16 to 3/8 by 32nds $1.52
13/32 to 1/2 by 32nds 1.92

SINGLE END — 4 FLUTE

3/32 to 3/8 by 32nds $1.40
13/32 to 1/2 by 32nds 1.80

VICTOR MACHINERY EXCHANGE, INC.
DEALERS IN TOOL ROOM EQUIPMENT
251-P Centre St. • New York 13, N.Y. • Phone CAnal 6-5575

Got a problem?

You should use Chicago "Safety Plus" Screws in Standard Listed Sizes

They fasten products more securely, give a tighter hold for a neater appearance, and our three quarters of a century of experience in making fine threaded products guarantees a consistently more uniform accuracy to create sharper, smoother threads for a quicker, easier fit. They save money, too, because fewer screws and a faster fit means LOWER COSTS all down the line. Call the INDUSTRIAL SUPPLY DISTRIBUTOR nearest you today. Ask him for Chicago and get "Safety Plus"

• Socket Screws
• Cap and Set Screws
• Nuts • Taper Pins • Studs

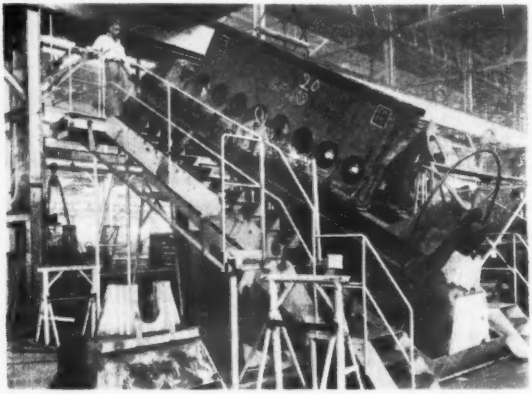
the Chicago SCREW COMPANY
2519 WASHINGTON BLVD.
BELLWOOD, ILL.

Inclined Fixture Spots Diesel H-Frame for Safe and Easy Welding

by **C. D. Lentz** Manager
Manufacturing Engineering Department
Baldwin-Lima-Hamilton Corp.
Philadelphia, Pa.

Fabricating the A-frame of the Baldwin-Westinghouse locomotive diesel from ⅜" to 4" steel plate is mostly a routine electrical welding operation. Analyzing the project from the standpoint of maintenance cost, hazards of scaffolding and operator convenience led to the design and construction of an inclined fixture that can be rotated and locked at any angle required.

The stand, built of welded steel plate forms a bedplate to which the workpiece can be clamped. To provide easy access for the welder, the fixture is mounted on pedestals, one of which stands at a higher elevation than the other so the frame will be tilted at an angle of 45°. The fixture is counterbalanced to facilitate rotation by hand, and, a notched disk, and dog hold it securely in any one of the job positions. A large handwheel made of pipe sections welded together provides the necessary leverage for turning the fixture and workpiece.

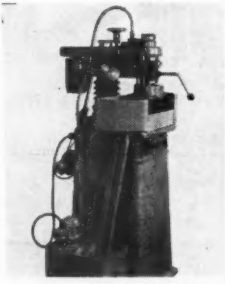


Mounted on each side is a sliding stairway constructed of sheet steel and built at the same angle as the fixture so the welders can easily get at any part or section. The stairways are mounted on supports made from sections of pipe welded together and fitted with handrails. Each stairway can be moved sideways to clear the engine frame when it lays on its side.

Vertical Spindle Surface Grinder for Small Work

A German-made surface grinder has been designed for medium and small work, but uses the very efficient vertical cupped-wheel principle that is characteristic of larger machines. The spindle is precision-bearing mounted to ensure plane-parallelism of the work within .0002". Accessories are available for either wet or dry grinding. Maximum grinding area is 4" x 10", while maximum height between table and wheel is 7".

Photo courtesy Technical Development Co.



Fine adjustment of depth of cut is provided by micrometer knob at top of spindle. Feed motion of wheel over work is done naturally, or in one direction automatically.

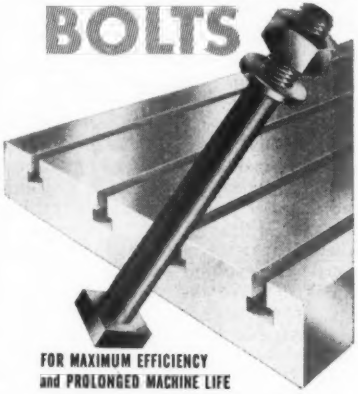
BOYAR-SCHULTZ

Precision-made

ALLOY STEEL

SPECIAL MACHINE

BOLTS



FOR MAXIMUM EFFICIENCY and PROLONGED MACHINE LIFE

It does not take long to ruin the accuracy of costly machine tools when poorly made, soft steel bolts of ordinary manufacture are used.

Boyar-Schultz SMB Bolts are precision made with heads at right angle to bodies, carefully machined to present a broad, flat surface to the upper surface of the T-slots. They are made from alloy steel forgings, heat treated for maximum properties and are tough and hard. Threads, class 3 fit will not easily strip or distort. SMB Nuts and Washers are specially made to give best results with SMB Bolts.

When compared with refinishing and trueing the bed of a machine tool, the cost of GOOD bolts is trifling.

WRITE FOR FREE CATALOG

BOYAR-SCHULTZ CORPORATION
2112 Walnut Street, Chicago 12, Ill.

RING PUNCHES

HARD...

tough...

concentric

Precision-made of both Carbon Vanadium and high carbon, high chrome steels. Available in a wide range of stock sizes from 1/32" to 1" point diameters in increments of 1/64" for immediate delivery. Decimal sizes to order for delivery within 48 hrs.

Button Dies
Ring Type or Press Fit

Hole tapered to eliminate slug jamming. Sizes in stock to match punch sizes.

Write TODAY for your copy of handy data sheets covering specifications and prices; also name of distributor in your area.

Dealer Inquiries Invited

Ring Punch & Die Co.
108 Foote Ave., Jamestown, N. Y.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

. . . Pressed Metal Institute, from page 162

ing on it, using rubber, where they used a rubber ring and pressed it from both ends with the shell in the center, and by the pressure of the rubber it would crimp the brass cartridge case into that groove beautifully. It did a wonderful job.

"The only trouble was that we couldn't get a rubber that would stand up more than about 600 shells. It would crystallize and flake and break away. We spent a year on it anyhow, and never got beyond that point, maybe sometimes 1000 or so. I am just wondering what has happened. Has rubber been improved, or is your process different from that, so that rubber does stand up longer?"

Answer: "That is a big question. We have experimented, of course, in the last three years with various compounds, and we are getting closer and closer, or we are improving as we go along, considerably. We found, for example, in the beginning it was very difficult to write specifications for rubber. We didn't know just what we wanted in the way of compounding. The physicals, naturally, that you want are the highest in every category. You want high tensile. You want high abrasion resistance, and so on, but rubber is very much like steel. As you increase one physical, you reduce another, and you end up compromising.

"There is no magic material that we can find that will remain flexible, that will have a long life and answer the purpose to the extent that we desire. We think we are getting closer. However, to be brutally frank, we just haven't got much better rubber today than the ordinary press pad rubber that you have been buying for years. However, the answer to life in our case is the means by which we hold the rubber diaphragm in and the way we isolate it from abrasion and abuse from the work, and I think it is just good engineering in getting that rubber in there in such a way that it isn't going to wear out.

"That case you talked about; I can appreciate what you were trying to do. You were working at probably very high pressures, and I don't believe that anything has been done to improve that. To my way of thinking, the next step to that thing would be to go directly to oil without rubber.

"We know of one manufacturer who has been using rubber at 40,000 pounds per square inch, and every time he opens the machine after that operation a big flame shoots out from the work. It is quite an interesting application. However, the rubber doesn't last very long, but he has a particular problem, requiring that pressure.

"We have hit on 15,000 pounds per square inch as a reasonable maximum. It is possible to go higher, but our maximum is based pretty much on the economic side. If we go much higher, or if we add 1000 pounds per square inch in capacity of the press, we add a lot of tons in the structure, and then reach a point very soon where the press is not economical."

Question: "I would like to ask Mr. Martin if this press pad can be installed on any hydraulic press and produce a practical application, or is it necessary to purchase a press as manufactured by Cincinnati Milling?"

Answer: "At the moment it is necessary to buy our equipment. This press we make is not like the standard hydraulic press. The upper ram or the cylinder for raising that ram is just large enough to lift the weight of that ram. It has no capacity for exerting any tonnage as far as work is concerned. So our press is strictly for the method. It cannot be adapted to any other process. You cannot put regular tools in it."

(To be continued)

★ ★ ★

High Strength Copper Silver Alloy

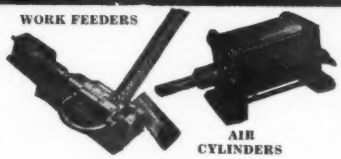
A new high strength copper-silver bronze with high electrical conductivity recently developed is currently available. This alloy, containing 94% copper and 6% silver, is sold only in the heat treated and cold worked condition. The drastic cold working of the heat treated alloy develops tensile strengths ranging from 140,000 to 165,000 psi, and electrical conductivity of 70% International Annealed Copper Standard. It is produced in round wire .160 diameter down to the fine gauges of magnet wire and in flat wire of equivalent cross section area having a maximum width of ½".

NEW MEAD INDUSTRIAL

AIR POWER CATALOG Ready!

AIR VISES

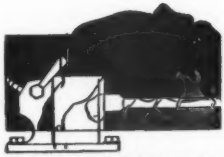
WORK FEEDERS



AIR CYLINDERS

AIR PRESSES

AIR CLAMPS*



Full of Suggestions

For FASTER, CHEAPER PRODUCTION

Illustrates, describes Air Cylinders, Valves, Air operated Presses, Vises, Chucks, Hammers, Drill Press Feeds, Work Feeders, Timers, semi-automatic combinations, etc.

Write for Complete Catalog! **Pneumatic Cylinders*

MEAD SPECIALTIES CO. 4114 No. Knox Ave., Dept. HA-82, Chicago 41, Ill.

WHITNEY - JENSEN PRODUCTS
41 YEARS EXPERIENCE

Send for
Your Copy of
our new

CATALOG
No. 16-52

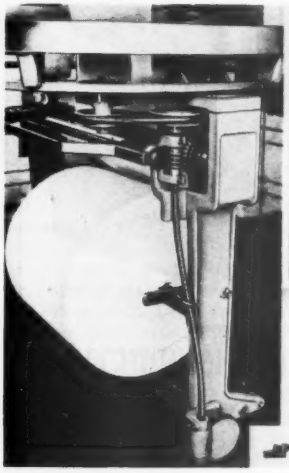
•

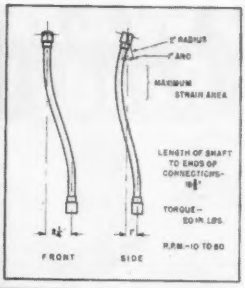
IT FEATURES THE
COMPLETE
WHITNEY - JENSEN
LINE

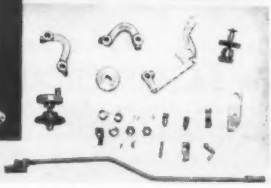
WHITNEY METAL TOOL COMPANY
724 FORBES STREET • ROCKFORD, ILLINOIS

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Knitting Machine Bobbing Mechanism Powered by Flexible Shaft Drive







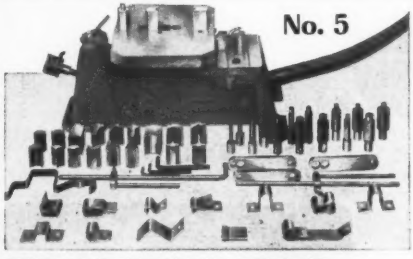
The adaptability of flexible shaft power drives to unusual operating conditions is demonstrated in this installation designed for the manufacturer of the knitting machine shown in the illustration.

Use of the flexible shaft drive in this instance made it possible to go around one of the supports of the machine without the use of miter gears, to simplify design, and to reduce the number of parts.

Because the mechanism has a bobbing motion, there is considerable strain centered in one area. Engineers designed a special core, specifying types and grades of wire that are fitted to meet the operating conditions in this particular installation.

The sketch illustrates the operation of the flexible shaft unit. Shown below are the 24 parts (57 separate pieces when completely dis-assembled) that were eliminated by the flexible shaft design.

Photo courtesy
Elliott Manufacturing Company



WRITE FOR DESCRIPTIVE CIRCULAR

Multiform BENDER-CUTTER

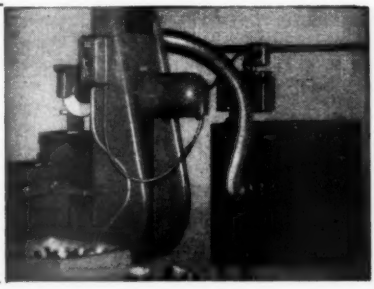
CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to 3/16" x 1½" as illustrated, other models up to ¼" x 4".

J. A. RICHARDS CO.
KALAMAZOO, MICH.

STOP DUSTS
INSTANTLY *with*
DUSTKOP

Available from stock of 22 standard models
300 cfm to 10,000 cfm
Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—No Obligation.
AGET-DETROIT CO.
213 Main St. Ann Arbor, Michigan



ETALON No. 9

$37..30
F.O.B., N. Y.

.001"
and
1/64"

HARDENED STAINLESS STEEL

Overall Length 10". Measuring Capacity is 7".
Width of Nibs when closed is ¼".

Known the world over for fine accuracy. Hand fitted vernier assures smooth, snug operation. COMPLETELY GUARANTEED. Furnished in handsome form fitting wooden case.

ASK YOUR DEALER or write

ALINA CORPORATION • 401 BROADWAY • NEW YORK 13, N. Y.

THREAD MEASURING MADE EASY WITH NEW 60° THREAD TRIANGLES

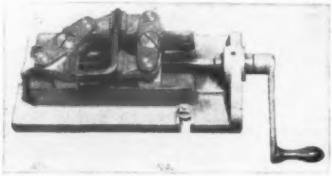
Quickly checks all 60° standard and special threads from 4 to 56 pitch . . . ANY O.D. Perfect class 3 or 4 fit. No "fancy" calculations . . . just add a constant to O.D. That's all.

Comes complete with chart.

WRITE FOR BULLETIN

MONTGOMERY & COMPANY, INC
53-T PARK PLACE • NEW YORK 7 N.Y.

CLAMPMASTER



THE VISE THAT HOLDS EVERYTHING

Eliminates fixtures for the holding of odd-shaped work pieces. Quick adjustment for positive holding of round, elliptical, tapered, triangular, or irregular shapes. Two moving jaws for quick centering of work. Available in four sizes for bench or machine work of all types.

THE VISE OF A THOUSAND USES

For full information write

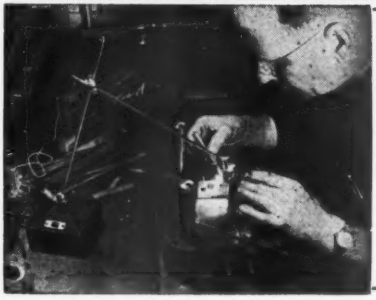
KARL A. NEISE
381 - 4th Ave., Dept. MMS, N. Y. 16, N. Y.

EXTRA HARD — EXTRA TOUGH

for
Millers
Duplicators
Die Sinkers
Pantographs

BLACK STRAND Cutters-Blanks

Write for Literature and Prices
EDWARD D. STRAND COMPANY
Box 54, West Side Sta., Worcester, Mass.



UNEEDA LIGHT directs a beam of white light on your close precision work . . . .

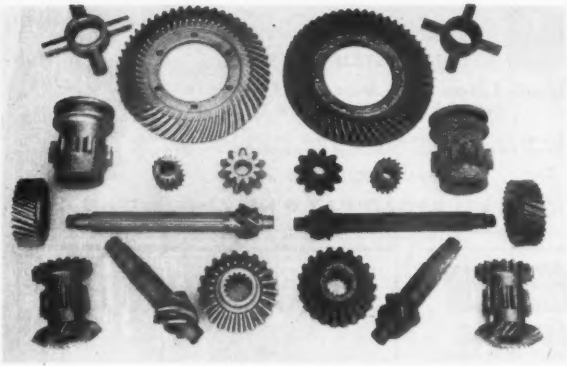
Tool and Die Makers acclaim it for its utility, getting into nooks or crevices hard to get at with ordinary light—for lining up punches in dies, or working with the scriber in close places. Completely adjustable and portable. Light does not reflect back to your face. Ideal for Inspectors seeking burrs, flaws, etc. Price— complete with 2 size bulbs, $13.75

Write for Literature

Twentieth Century Mfg. Co.
3720 Montrose Ave., Chicago 18, Ill.

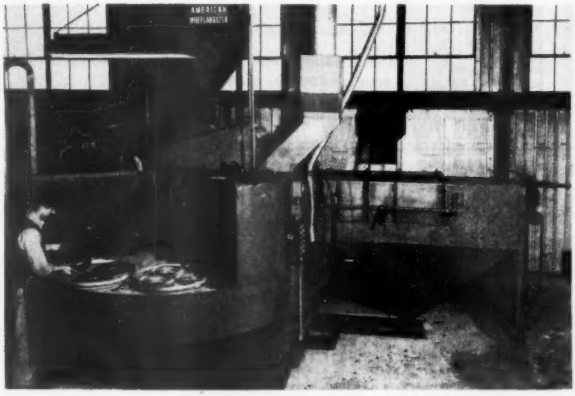
SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

Cleaning and Peening Gears in One Machine



View of gears and related products cleaned on the Wheelabrator multi-table at Fairfield Mfg. Co., Lafayette, Ind. The parts on the right show the condition before blasting. The parts at the left are shown clean down to the virgin metal after a few minutes of airless blasting. Cleaning requirements at Fairfield are two fold. Rough forgings are purchased from suppliers in the "as-forged" condition and are annealed in the Fairfield plant. Scale from the forging and annealing operations is removed in two standard tumble-type airless blasting machines.

Airless blasting for cleaning and peening makes important economies in the manufacture of gears, especially when one standard airless blasting machine is specially equipped to do both cleaning and peening. At right is a view of the specially-equipped multi-table blasting machine for cleaning and shot peening gears at Fairfield. Each machine has a barrel capacity of 11½ cu. ft. and the parts are tumbled by a continuous apron-type belt conveyor under the blast thrown from a rotating, bladed wheel in the roof of the machine. All parts are blasted so that a perfectly clean surface is provided for subsequent machining operations.

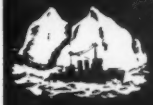


Photos courtesy American Wheelabrator & Equipment Corp.

Above view shows gears from which heat treat scale has been removed. For this purpose, a multi-table machine having eight 28" diameter work tables mounted on a spider is used. These tables individually rotate under the blast of metallic abrasive thrown from an airless wheel in the roof of the cabinet.

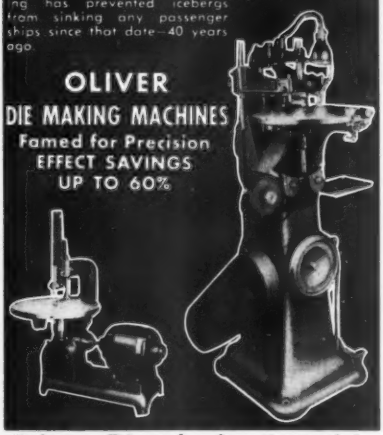
The table is also equipped with facilities for shot peening to increase the fatigue life of the gears. Above is shown an arbor containing small helical gears placed on the rotating discs of the special car. The car moves into the blast zone, and rotates the arbor under the blast of metallic abrasive.

FAMED for PRECISION



U.S. Coast Guard Cutters Have Won International Fame For Their Precision Charting of Icebergs

For centuries icebergs have presented a serious threat to North Atlantic shipping. Following the tragic loss of the S.S. Titanic in 1912 the U.S. Coast Guard took over the Iceberg Patrol. Their ceaseless, precise charting and tracking has prevented icebergs from sinking any passenger ships since that date—40 years ago.



OLIVER
DIE MAKING MACHINES
Famed for Precision
EFFECT SAVINGS
UP TO 60%

Toolroom efficiency has been increased in thousands of plants throughout the World by the Oliver Method for machine sawing, filing and lapping operations. Oliver Die Makers are simple to operate . . . skilled labor is not required . . . they have a long, dependable, operating life . . . in fact, many have been in continuous use for more than 25 years. Their speed and accuracy helps save time and headaches and increases toolroom efficiency . . . been doing it for almost 40 years.

OLIVER DIE MAKERS
Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write Today For Complete Technical Data on OLIVER DIE MAKERS

OLIVER INSTRUMENT CO.
1436 E. MAUMEE · ADRIAN, MICHIGAN

Specify **DURANT**
PRESS ROOM EQUIPMENT

INCREASE PRODUCTION
REDUCE COSTS

ROLL FEEDS
Accurate Feeding • Reversible • Easy to install • Highest quality

SCRAP CHOPPER
Fits any Power Press • Electrical Plug Installation • Pays for itself —you get more for your Scrap

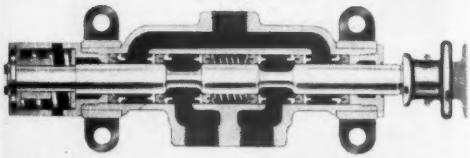
STOCK OILER
Save Your Dies • Eliminates hand oiling • Made in variety of sizes

Write Now!
Inquire about this complete Durant line of Low Cost Equipment
Free Catalog Available

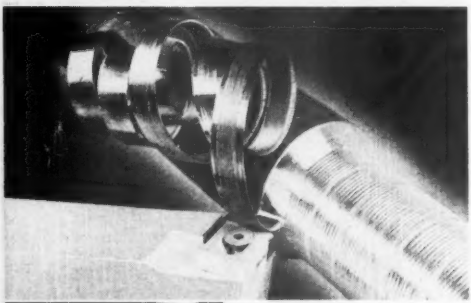
DURANT TOOL SUPPLY CO.
155 ORANGE ST., PROVIDENCE 3, R. I.

PROGRESS

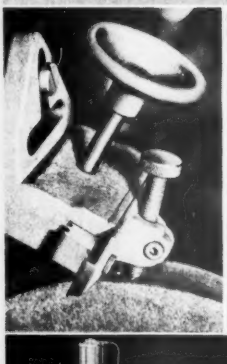
NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS

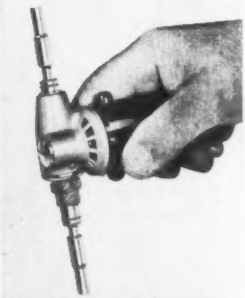


A New Spring Centered Neutral Valve has been added to the Valvair Corporation's line of air control valves. Good design features giving maintenance free operations of over twenty million cycles are incorporated. The new valve is made in a variety of types, styles, and sizes, for use with air, water, oil, or inert gases, at pressures to 300 PSI. Folder K from the Valvair Corporation, 952 Beardsley Avenue, Akron 11, Ohio.
Circle Inform-A-Gram No. A1.



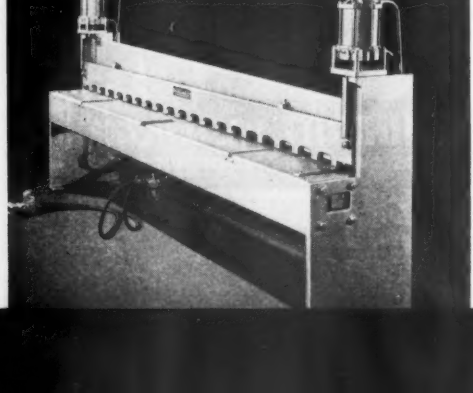
DoAll Turning Tool Takes Extra-Large Cuts. The "Hefti-Cut" is a rugged alloy steel shank holding carbide blanks, with a special positioner which allows the use of 60% of the blanks before discarding due to insufficient clamping area is necessary. Since the blank can expand as it heats during work, heavier cuts may be taken than with many cemented carbide tools, where the differential in expansion often causes cracking under heavy cuts. DoAll Company, Des Plaines, Illinois.
Circle Inform-A-Gram No. A2.





The Red Flash Wheel Dresser is ruggedly and precisely built, and is compact enough to adapt to most pedestal and other grinders without disturbing tool rest setting. A universal clamp permits ready attachment without the use of bolts or other fasteners. Easy traverse and infeed give quick setting and accurate results. Write the Monarch Machine Shop Inc., 2530 Pennsylvania Avenue, P.O. Box 3026, Madison 4, Wisconsin.
Circle Inform-A-Gram No. A3.

Model SD-1 Dremel Moto-Screwdriver is illustrated. Both the SD-1 and its companion model SD-2 operate on 110-115 volt AC or DC, and are light and small and designed to be used without fatigue at right angles to the work. The SD-1 weighs 12 oz., is 4¾" long with a driver-bit speed of 1200-1400 rpm. For further details write the Dremel Mfg. Co., 2420-18th Street, Racine, Wisconsin.
Circle Inform-A-Gram No. A4.

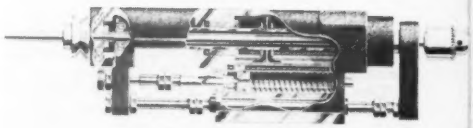


Air Powered Shearing Combines Speed And Economy. Niagara air-powered squaring shears eliminate such parts as motors, gears, flywheels, and clutches and brakes, while giving excellent performance through sound design. Features include automatic holddown of the work during cutting, adjustable ways in non-metallic laminated plastic, micrometer back gage. Alloy tool steel knives are standard, while high carbon, high chrome solid steel knives can be furnished for longest service between grinds. Niagara Machine & Tool Wks., 637-697 Northland Ave., Buffalo, N. Y.
Circle Inform-A-Gram No. A5.

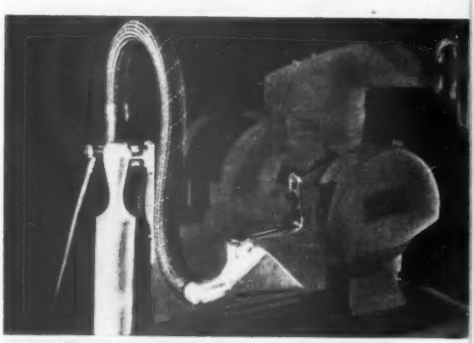
ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

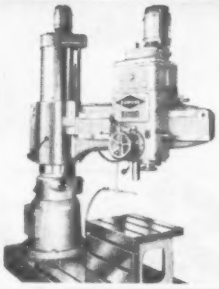
Gurmendi Air-Powered Drill Unit. Features include universal application in set-up and power choice, full control of stroke and speed of feed, and positive adjustment for forward and return strokes to and from work, controlled by unique hydraulic monitor which takes the "sponginess" out of air. Stroke is a full 2" with controlled feed of 1¼". Feed control is taken over at any desired point in the spindle travel by the monitor, giving fully adjustable rate. ¼" Jacobs chuck standard. Alkon Products Corp., 698 E. 142nd St., New York 54, N. Y.
Circle Inform-A-Gram No. A6.

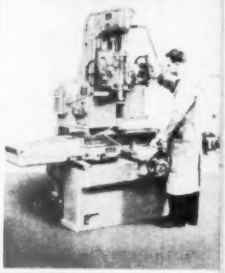


Vulcanaire Dust Collecting Units are quickly cleaned, requiring no refills. Positive location of dust cup is assured by mounting on the wheel guard, permitting constant contact with dust as wheel is moving. The collector element is mounted on the side of the machine. A needle valve operates the unit, and can be shut off when machine is not in use. Operated by your existing air supply. Vulcan Tool Co., 30 Lorain Ave., Detroit 10.
Circle Inform-A-Gram No. A7



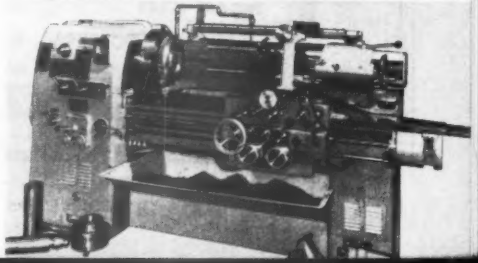
A New Heavy Duty Radial Drilling Machine, with sizes from 3 through 8 feet, has been announced by the Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Cal. The arm moves on three guiding surfaces, ensuring absence of tilt and distortion in both horizontal and vertical planes. A disc clutch provides smooth start for tapping, while an automatic brake stops the gear on disengagement of the clutch.
Circle Inform-A-Gram No. A8.





No. 1E Is New Small P & W Jig Borer Featuring Electrolimit Measuring System. Table Settings accurate to .0002" are quickly made, two measuring units controlling the longitudinal and transverse settings. Basic 1" spacings are made electromagnetically from a solid master bar. Original accuracy indefinitely retained, as there are no contacting surfaces and no wear. Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford 1, Conn.
Circle Inform-A-Gram No. A9.

The Sensitast Copying Lathe is introduced by the Cosa Corporation of 405 Lexington Ave., New York 17, N. Y. The copying feature is controlled by electromagnetic clutches, and will take 90° cuts on the workpiece sides. Most inside or outside forms may be copied. The traverse and longitudinal feeds operate at the same speed to give smooth uniform finish, while a feed reducer with magnetic clutch control is employed. Heavy cuts may be taken because of the unusual headstock design.
Circle Inform-A-Gram No. A10.

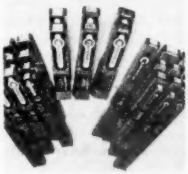


Small Magnetic Chucks for bench work and small machine tools are made by the Hanchett Magna-Lock Corporation. The chucks are precision built, are moisture and shock proof. In sizes 5"x10", 6"x12", and 6"x18", these chucks facilitate holding work pieces for hand sawing, scraping, layout, filing, welding and drilling and similar operations. Hanchett Magna-Lock Corp., Dept. 350, Big Rapids, Mich. **Circle Inform-A-Gram No. A11.**

New Standard Zagar Heavy Duty Drilling Machines. Zagar Tool Inc., 24000 Lakeland Blvd., Cleveland 23, now make four sizes which will drill as many as 600 holes at once. Zagar drill heads are driven direct by electric motors ranging from 5 to 30 hp, while a hydraulic ram feeds and returns the work. Change from job to job is comparable to punch press set-up and is quickly accomplished. Machines are self-contained. **Circle No. A12.**

New Pancake Head Thread-Cutting Screw is ideal for molding into rubber or plastic. In application rubber is molded round the special screw head, the enlarged pancake surface gives holding power, and the hexagon feature prevents the screw from turning. Screws feature a thread design that permits free cutting in all plastics without chipping or breaking. Shakeproof Inc., St. Charles Rd., Elgin, Ill. **Circle Inform-A-Gram No. A13.**

Attractive New Packaging Features Capewell Hack Saw Line. The Capewell Mfg. Co., Hartford, Conn., now package their saw blades with distinctive color coding to differentiate between the various types. Bold face color coded end markings make easy identification of blade type and size. Metal edges provide extra strength on the corners, eliminate danger of breakdown on ends or sides. Easy stacking and handling has been achieved. **Circle No. A14.**



Enjoy GREATER EFFICIENCY, INCREASED PRODUCTION with

ROUSSELLE

PUNCH PRESSES

for all your requirements. Write for descriptive literature TODAY!

SERVICE MACHINE CO.
7627 S. Ashland Ave., Chicago 20, Ill.

HIGH SPEED CARBIDE

Severance

MIDGET MILLS CHATTERLESS COUNTERSINKS

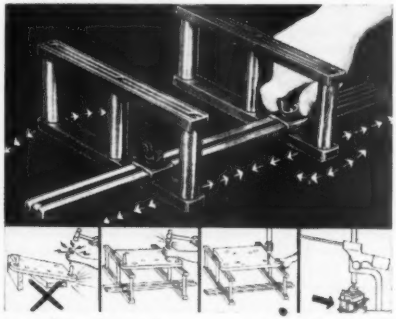
SPECIAL CUTTERS — REGRINDING SERVICE

ASK FOR OUR GENERAL CATALOG

Severance Tool Industries Inc.

730 Iowa Ave., Saginaw, Michigan

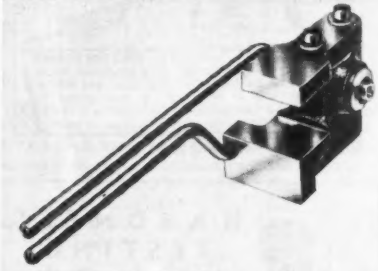
The Acro Die Cradle. This is an adjustable portable safety parallel unit newly announced by Acro Safety Parallel Div., 24 South Crawford Ave., Chicago 24. It is designed to give positive support to die and jigs while drilling, tapping, counterboring or milling. The device is made of high grade steel, hardened and



ground to close tolerances, and has bolts and wing nuts to give quick adjustment to any desired spread up to 18", while the parallel units can be pivoted at practically any required angle, either inwards or outwards. The Acro die cradle is available in parallel heights of from 3" to 7".

Circle Inform-A-Gram No. A15.

The Jr. Mijit Precision Drill Jig is a new addition to the line produced by Esco Engineering Corporation, 1940 E. Woodbridge St., Detroit 7. It is designed for accurate drilling on very small parts, and should be particularly useful in the radio, television, small arms, instruments, and appliance industries. The jig



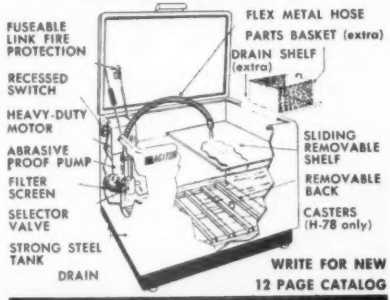
is self-clamping in any position, using the same handles for locking the part and for locating and holding the fixture under the drill. It is easily adaptable to various size parts within its range up to 1½". All working parts, including posts, rack, and gear are hardened and ground to close limits. Shut height is infinitely variable from 1" to 1½", while the working area is 1"x1⅛". Jig locking handles are 6" long.

Circle Inform-A-Gram No. A16.

Saves 35% TO 65% CLEANING TIME

GRAY-MILLS AGITOR PARTS CLEANING UNITS

FOR... MAINTENANCE, TOOL and DIE WORK —SOME PRODUCTION JOBS

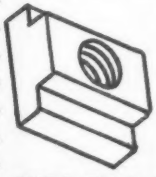


WRITE FOR NEW 12 PAGE CATALOG

GRAYMILLS CORPORATION
3713 LINCOLN AVENUE • CHICAGO 13

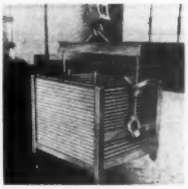
ENCLOSURE SAFGUARD FOR PUNCH PRESSES

Strand Mfg. Co.
DEPT. B, P. O. BOX 762
LOS ANGELES 44, CALIFORNIA



T NUTS
Stud Sets
•
Strap Clamps
•
SURE GRIP STEP BLOCKS

TIETZMANN TOOL CORP.
315 N. Main St., Englewood, Ohio

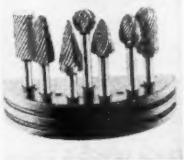


New Scrap Box Has Simple Dumping Device. A portable scrap box by Equipment Mfg., Inc., 21550 Hoover Rd., Detroit 5, has several features to simply movement of scrap within the plant. The unit is a corrugated steel box with yoke for handling by crane or hoist. When the load is over the dumping point, a lanyard is pulled which lifts the fingers off the locking bar and the box automatically turns over and discharges the load. Full details from maker. **Circle Inform-A-Gram No. A17.**

New Reamer Has Interchangeable Head To Cut Cost. The Tomkins-Johnson Co., 617 N. Mechanic Street, Jackson, Mich., makes this reamer in spiral or straight flute styles. Replacement cost is cut by more than half, and initial cost is also low. The head is a precision taper fit for quick removal, cutting edge cannot wear undersize and create negative relief and binding. Point of reamer can always be kept sharp for free cutting. **Circle No. A18.**

Sine Plates, affording appreciably larger surfaces for precision angle checking on large work pieces, are now being made by the DoAll Company, 254 N. Laurel Ave., Des Plaines, Ill. They are available in two sizes, 5" and 10". Top area of the 5" plate is 6"x6", of the 10" plate 7"x12". The plates are ideal for precise checking of compound angles, and the various degrees of angle of a sine chuck also may be most accurately checked. **Circle Inform-A-Gram No. A19.**

High Speed Midget Mills have been grouped together in a set of popular ¼" shank sizes by Severance Tool Industries Inc., 730 Iowa Street, Saginaw, Michigan. An attractive wooden tool block for convenient storage and handling is supplied with each set. Seven midget mills are included in the set, all with half inch diameter cutting heads as in the illustration. They are made in high speed steel, and cut fast and clean on a wide range of metals. **Circle No. A20.**



RAYMAC
Solid Carbide
CENTERLAPS

Raymac Solid Carbide Centerlaps save time and money by eliminating costly dressing. They are designed to replace abrasive centerlaps and to lap centers in hardened steel. Constant maintenance of correct angle is featured.

Raymac Centerlaps can be used on any standard drill press, centerlapping machine or lathe at normal speeds.

These centerlaps can be made with any desired angle.

Write for Catalog No. 12.

RAYMAC
MANUFACTURING COMPANY INC.
3729 CASS AVENUE, DETROIT 1, MICH.

"THE ORIGINAL"
MAUSER PRECISION VERNIER CALIPER
$14.75 PPD

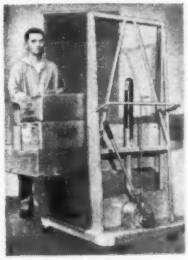
NEW EXCLUSIVE CAMLOCK AND GIB IMPROVEMENT INSTANTLY FIXES SETTING, PREVENTS SHIFTING, GUARANTEES SQUARENESS OF JAWS.
THE MAUSER TRADEMARK.. IS YOUR PROTECTION.

MONEY BACK GUARANTEE
FOR MEASURING INSIDE, OUTSIDE, AND DEPTH.
3 GRADUATIONS
1/1000" — 1/128"
1/10 mm. IN BACK

GEO. SCHERR CO. INC. 200-1 LAFAYETTE ST. • N.Y.12, N.Y.

HARDNESS TESTING
has been done with the
SCLEROSCOPE
since 1907

THE SHORE INSTRUMENT & MFG. CO., INC.
9025 Van Wyck Avenue
Jamaica 2, N. Y.

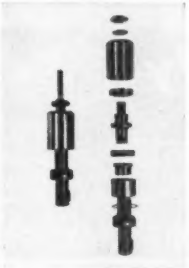


The Century "1000" is a manually operated and propelled hydraulic lift designed to combine low initial cost with utility and versatility. It weighs only 150 pounds, and will raise a 1000 pound load from floor level to a height of 4' or any immediate position. A small lever releases the platform for controlled descent. The material platform —23" by 24" is elevated by a two-cylinder double-acting reciprocating pump, which contains only three moving parts. Dept. KP, Century Products Co., 5925 Highway 7, Minn. 16. **Circle Inform-A-Gram No. A21.**

"640" Series Unit Work Benches from the Standard Pressed Steel Company, Box 600, Jenkintown, Pennsylvania, have unusual storage space in drawer and cabinet pedestal units. Tools, plans, and materials can be put

away, and the tops kept clear for work. These new benches are available for use as continuous benching or single work stations. **Circle Inform-A-Gram No. A22.**

New Floating Tap Holder For Multiple Spindle Machines. Scully Jones & Co., 1913 So. Rockwell St., Chicago 8, announce the new model "JT" whose features include small body diameter for operations on close centers, special tap centering method to reduce strain and tap damage, and positive lubrication of all operating parts. The "JT" is similar in construction to the proven model "JA", and has the same double gear spline drive coupling for the immediate driving member.



Circle No. A23.

STOP WEAR on Die Sets

. . . with ACRO Pin Oilers

Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminates bushing wear, leader pin scoring, and maintains die accuracy.

Write for FREE Bulletin

describing Acro products
Ask for Bulletin TD-30.

ACRO Metal Stamping Co.

330 E. Reservoir Ave., Milwaukee 12, Wis.

WHICH ARE YOU USING?

. . . the grunt-pull, hammer-wrecking bar, costly method of die separation . . . using two or three men? Results are pinched fingers, scored pins, battered dies and waste of time and money.

OR

. . . the modern efficient method that is now in actual use by hundreds of leading plants and die shops* —The Acro Die Set Puller method. Write for free information. Ask for bulletin TD 1250.

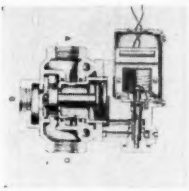
*List of users on request.

ACRO METAL STAMPING CO.
330 E. RESERVOIR AVE.
MILWAUKEE 12, WIS.

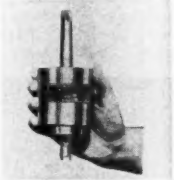
New Angle Adapter expands the scope of blind riveting to many additional assembly and maintenance operations. Designed for use with Huck hand or air riveting tool, the adapter simplifies assembly of deep channels and other hard to reach locations. Huck self plugging or pull through blind rivets can be driven in clearance space of 4" from nose of riveting tool to back face of angle adapter. Huck Mfg. Co., 2480 Bellvue Ave., Detroit 7.
Circle Inform-A-Gram No. A24.

Diamond Wheel Lap. Life of cutting tools can be increased from 3 to 6 times, and sharp, finish-lapped cutting edges through use of wheel lapping method developed by Penn Scientific Products Co., 5941 Alma Street, Philadelphia 24, Pa. Diamond lapping compound in any desired grit size is applied to special Spectrum lapping wheels, which wear indefinitely and are interchangeable on all tool grinders.
Circle No. A25.

Special Air Control Valve provides the ultimate in safety. Hannefin Corporation, 1164 South Kilborn Ave., Chicago 24, have new 3 way solenoid "Pilot-Master Valve for press control, where the failure of a valve to reverse when the solenoid is de-energized might result in a serious injury to the operator. The valve is without springs, automatically returns to inoperative position by air pressure the instant the solenoid is de-energized.
Circle Inform-A-Gram No. A26.



"000 Cone Drive Tapping Chuck" is announced by Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y. This new chuck is compact and of light weight, has maximum capacities, and runs best at high speeds. It features interchangeable shanks, and has an oil resistant cone, needle bearings top and bottom of main spindle. It is available with collet chuck or Jacobs "rubber flex" tap chuck.
Circle No. A27.



SAVE
TIME and MONEY
with
GARBERDING

STOP-PINS
AVAILABLE IN 5 SIZES

FINGER STOPS
IN 3 SIZES

STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices. GARBERDING FINGER STOPS made in uniform width to fit any standard width slots. Just grind ends to fit.

Write for literature.

TWENTIETH CENTURY MANUFACTURING CO.
3720 MONTROSE AVENUE CHICAGO 18 ILLINOIS

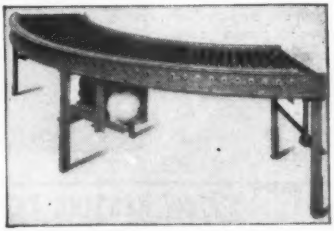
Specify DESTACO Arbor Spacers and Shims

For milling, slitting and gang-saw setups, shimming gears and bearings. Sets in 20 diameters ⅜" to 4". 19 graduated thicknesses .001" to .125", specials over .125". Spacers with keyways, shims without. Stocked by Industrial Distributors.

DESTACO DETROIT STAMPING COMPANY
344 MIDLAND AVENUE • DETROIT 3, MICHIGAN

A 10" Tool Makers Height Gauge, manufactured by Benson Verniers Ltd., England, is imported into this country by Transocean Trading Co., 6453 Santa Monica Blvd., Los Angeles 38. This high quality precision instrument is made in hardened and lapped tool steel, with ample dimensions for strength, accuracy, rigidity and a long life. Adjustable vernier plate for wear adjustment, depth rod and offset scribers are available with the gauge. Details from agent.
Circle Inform-A-Gram No. A28.

A New Live Roller Curve with basically new driving principle is announced by Samuel Olson Mfg. Co., Inc., 2423-27 Bloomingdale Ave., Chicago 47. The unique feature is the chain drive which travels round the outside



perimeter of the curve. Each link of the chain has a flat top plate so arranged that the plates form a continuous flexible band when the chain is assembled. Rubber bushings on the rollers ride on chain top plates; roller speeds to 120 feet per minute.
Circle Inform-A-Gram No. A29.

Simple Mandrell Expands Like a Collet. This mandrel simplifies the holding of workpieces during machining operations. Made in one piece, it is slotted to form three cantilever sections that deflect positively to engage the workpiece. Each mandrel has one, two or three gripping diameters and is made in the standard C-5 collet sizes; diameters range from 7/32" to 1½" by 1/32" steps. Full information with details on how to order may be had from the manufacturer, the E. Westberg Corporation, 800 Beley Avenue, Syracuse 11, New York.

Circle Inform-A-Gram No. A30.

Precision Feeds For All Presses

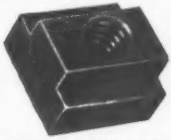
- Easily installed on any press
- Can't slip. Reverse instantly
- Feed in thousandths
- Maintain original setting. No ratchets or pawls to wear down and affect feed spacing.

Write for descriptive literature TODAY.

ROLL-FEEDS CORPORATION
Pawtucket, Rhode Island
An Electrix Affiliate

CHICAGO **DIES**
Complete Line of PUNCHING and FORMING DIES for All Sizes and Makes of PRESS BRAKES
DREIS & KRUMP MANUFACTURING COMPANY
7428 S. Loomis Blvd., Chicago 36, Ill.

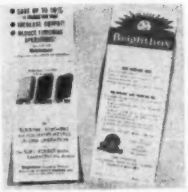
SEND FOR FREE CATALOG TODAY



T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

QUARTER TURN SCREWS
SHOULDER SCREWS
DOUBLE END JIG FEET
SCREW TYPE JIG FEET
PRESS TYPE JIG FEET
FLANGED NUTS
CUT THREAD STUDS
TEE-NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
STAR TYPE HAND KNOBS
HEXAGON TYPE HAND KNOBS
KNURLED HEAD SCREWS

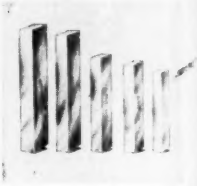
Northwestern
116 HOLLIER AVE., DAYTON 3, OHIO



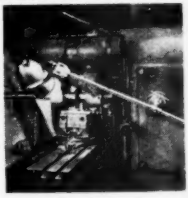
Rubber-Cushioned Abrasives Sample Card has just been issued by the Weldon Roberts Rubber Co., 6th Ave. & N. 13th Street, Newark 7, N. J. Three working size Brightboy hand tablets are mounted on the card. Textures are Fine-Tex, for soft metals and special finishes, Standard, for burring, finishing, cleaning and polishing, and Tuff-Tex, for removing tool and weld marks. Each of the three textures made up in rods, blocks, sticks, and wheels.
Circle Inform-A-Gram No. A31.

New Cup Type Grinding Wheel Retains Cutting Edge Throughout Service Life. United States Rubber Co., Rockefeller Center, New York, has developed a wheel with a shell of tough resin-bonded abrasive built round a core of similar construction. The shell is 3/16" thick, resists rounding at the cutting edge, and evenly distributes wear across the wheel. Available with three standard arbor types, it is particularly useful for grinding corners.
Circle No. A32.

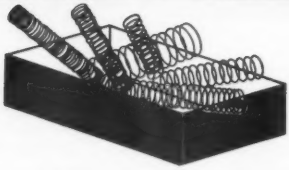
These New Tool Bits are made in special super H.S. steel of precisely balanced carbon and vanadium which gives an extra-fine grain structure. The bits are heat treated to achieve 66 to 68 "C" scale Rockwell, and are ground to close tolerance without decarburization. These du Mont bits have extreme toughness and resistance to abrasive action. Performance compares favorably with colbalt steel. duMont Corporation, Greenfield, Mass.
Circle Inform-A-Gram No. A33.



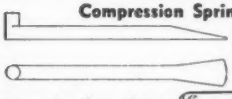
A Fully Adjustable Machine Lamp has just been announced by Bretford Mfg. Co., Inc., 2844 Commerce Street, Franklin Park, Ill. It has a special heavy-duty design to eliminate maintenance. Careful measures have been taken to avoid failure of the insulation against oil and water. Flexible joints give movement over three planes. A on-off switch is mounted on the reflector next to the adjustment for operator.
Circle No. A34.



REID TIME SAVERS



Compression Spring Assortments



Trigger stops for progressive dies. Also gauge stops for dies and fixtures.

Gage handles: Taperlock, Trilock; steel, plastic.

Magnetic Parallels. Single block or ground in pairs. Many sizes. Also magnetic "V" blocks.

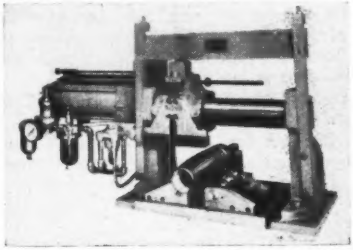
Also hand wheels, machine handles, levers, cranks, fixture units, cast iron knobs, threaded plastic and steel balls. Write for catalog and prices on complete REID line.

REID TOOL SUPPLY CO.
709 Baker St., Muskegon Heights, Michigan

New NESTING TYPE TOTE PANS
20" Long x 12" Wide x 6¼" Deep
16 Ga., drag holes, handles both ends.
J. L. LUCAS & SON, INC.
BRIDGEPORT 5, CONN.

- - For Sale - -
TUNGSTEN ROUNDS
(18-4-1)
36 Bars — 2.739" (+ — .002)
Ground and Polished
We have about 9,000# available in Carpenter "Star Zenith" and Crucible "Rex AA"
"NO CMP REQUIRED"
Certificates Available
Priced At Mill Base
GLOBE INDUSTRIES
1815 Franklin St. Detroit 7, Mich.
WOodward 1-8277

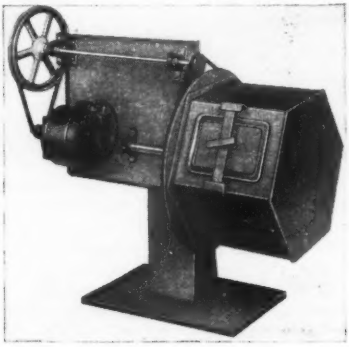
The Acromark Model 9AMA Marking Machine combines air-feed and ejector with motor driven marking, resulting in a completely automatic machine for production line work. The machine is designed for marking such cylindrical parts as shells, cartridges and shafts,



and uses an interchangeable die holder in which can be inserted steel marking dies or type of any desired design. As the part is rotated in a set of ball-bearing cradle rolls, the die passes over it to impress the mark. Write for complete information to the Acromark Company, 439 Morrell Street, Elizabeth, New Jersey.

Circle Inform-A-Gram No. A35.

A New Low Priced Barrel Finishing Machine has just been added to the line of Tumbler-Mixers made by the Rampe Manufacturing Company, 3320 St. Clair Avenue, Cleveland 14, Ohio. This model TMK has a hexagonal steel burring barrel of 200 pound capacity which is turned at 33 rpm by a ¼ hp 110 volt AC single phase motor. Anti-friction



bearings are fitted throughout, and automatic slack take-up keeps the turntable belt tight. Barrels are furnished either unlined or lined with Vinyl Plastic for maximum resistance to oil and chemicals. Full details from the manufacturer.

Circle Inform-A-Gram No. A36.

Just slip a tap adapter into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 13"x8"x14". Includes 9 adapters (8/32 to 3/4"). Taps not furnished. Dahlstrom Mfg. Co., 5601 Woodlawn Blvd., Minneapolis 17, Minn. Write for Pamphlet on Tap Guides, Autostops, Tap Chucks.

Dahlstrom TAP GUIDE

for fast... accurate... keen-cutting files specify **haskins**

Set G-501

When you want the finest in hand-cut, ground or carbide cutters, specify Haskins. They give you many advantages over ordinary files—faster cutting, longer tool life and fewer resharpenings—advantages that mean reduced costs, reduced labor and lower over-all tool costs.

Pictured above, set G-501, available also in hand-cut set H-501. For additional shapes, send for complete catalog—R. G. Haskins Co., 605 S. Washtenaw Ave., Chicago 12, Ill.

HASKINS **haskins**
FLEXIBLE SHAFT EQUIPMENT

Security Guide for Industry

July publication of a security guide primarily for members of industry engaged in the defense production program has been announced by J. D. Small, Chairman of the Department of Defense Munitions Board.

The new booklet "Standards for Plant Production", contains 53 pages and lists basic minimum security standards for more that 90 separate security measures recommended to defense plants.

The application by private industry of the standards set forth in the booklet are not compulsory, but are recommended by the Munitions Board staff for industry to follow to insure more security for their plants.

These recommendations are based on the best practices now being followed within industry and are the result of several years research and consultation by defense industrialists with the Munitions Board staff.

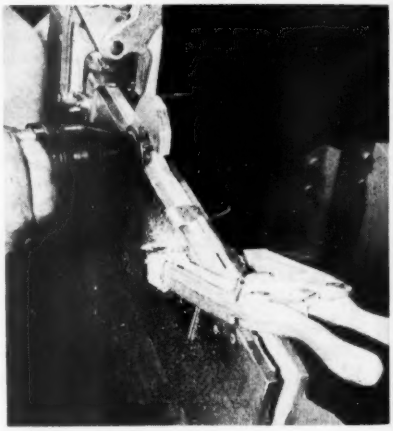
"Standards for Plant Protection" supplements the Munitions Board booklet, "Principles for Plant Protection" and it may be obtained for the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 20 cents a copy.

★ ★ ★ ★ ★ ★

Hand Router Eliminates Rework and Scrap

A set of three small hinges jigs and a hand router is being used in the sheet metal section at Temco Aircraft Corporation, Dallas, Texas, to trim tooling tabs from aircraft skin sections much faster than was formerly possible, and to eliminate most rework and scrap which resulted from the method formerly used.

Previous to the development of the jigs by M. H. Guy, a Temco sheet metal leadman, tooling tabs were removed with hand shears or band saws, with the method depending on the thickness of the skins. These methods required excessive handling of skins which in turn resulted in scratched and marred surfaces. Often as much time was spent in burnishing and polishing as in actual trimming operations.



Each of Guy's jigs is made from two fiber strips, hinged together so that one fits flat on each side of a stack of skin sections. Each strip is faced with felt to prevent damage to skin surfaces. One of the fiber strips serves as a router guide and has a metal edge to prevent excessive wear. The jigs are made in sets of three, with one having a straight edge, one concave and one convex, so that tabs may be trimmed from curved as well as straight edges. Two adjustable stops insure accurate positioning of the jigs on the skin sections. They are held firmly in place by quick clamps.

From two to ten skins may be trimmed simultaneously, with the number depending on the thickness of the material. Positioning pins are inserted in the tooling pin holes to keep the skins in alignment until the jigs are clamped in place.

Since the jigs have been in use, less handling of the skins is necessary, with a resulting reduction in scrapped material due to scratched surfaces. Aside from the saving in material, trimming time has been cut in half.

Come next November your one vote just won't be enough. It'll take your neighbor's, your co-worker's, and your mother-in-law's to get us out of the trouble we're in! A mere 51% won't be enough! See page 59. E. W. P.

AN INVALUABLE MAGNETIC BASE LIGHTING UNIT THAT HOLDS 100 WATT BULB TO CURVED OR FLAT SURFACES INSTANTLY!

MITI-MITE NO. 250

Aluminum socket, rayon-flocked light shield resists heat. Holds up to 100 watt standard bulb.

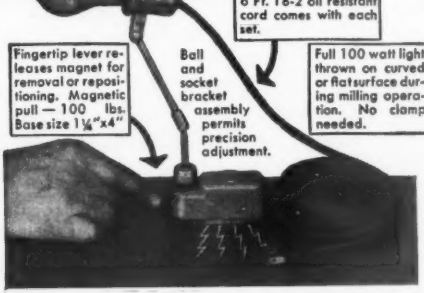
This amazingly useful "MITI-MITE" unit solves lighting problems heretofore regarded as impossible. Eliminates cumbersome, haphazard clamping. Provides perfect illumination for practically all machines and operations.

6 Ft. 18-2 oil resistant cord comes with each set.

Fingertip lever releases magnet for removal or repositioning. Magnetic pull — 100 lbs. Base size 1¼"x4"

Ball and socket bracket assembly permits precision adjustment.

Full 100 watt light thrown on curved or flat surface during milling operation. No clamp needed.



PRICE $18.50 Complete

ENCO MANUFACTURING COMPANY, Dept. 782
4524 W. Fullerton Ave., CHICAGO 39, ILL.

Order from your mill supply dealer or send order with name of your mill supply dealer

SEND FOR BULLETIN 604

OVER 1500 NOW IN USE!

ABA Precision Surface Grinder

WITH HYDRAULIC TABLE FEED AND ADDITIONAL HAND FEED

Where highest precision is required the ABA Precision Surface Grinder meets every test. With the aid of divided heads, sine plates, and other attachments it can handle the heaviest and most difficult jobs. Complete hydraulic table feed as well as manual operation make this grinder doubly practical. The use of ball bearings means extremely easy handling of all hand wheels and operating levers.

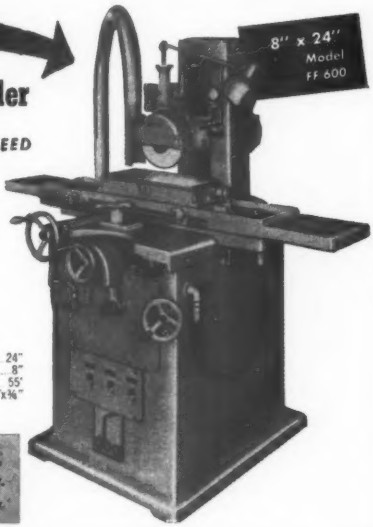
STOCK DELIVERY
NO PRIORITY REQUIRED

PARTIAL SPECIFICATIONS

Max. length of grinding area	24"
Max. width of grinding area	8"
Long. table speed, infinitely variable FPM	55'
Grinding wheel	8"x¾"

Write today for full specifications.

8" x 24" Model FF 600



MOREY for machine tools!

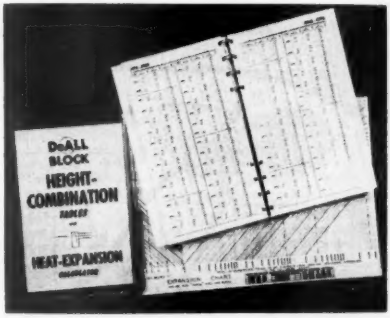
MOREY MACHINERY CO., INC.
Manufacturers • Merchants • Distributors
459 BROOME ST. • NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-7400
CABLE ADDRESS: WOODWORK, N. Y.

Aid In Use of Gage Blocks

The process involved in selecting gage blocks to obtain a combination of the desired length for gaging is considerably simplified through the use of the "Height-Combination Tables - Heat-Expansion Calculator Book." This reduces to a minimum the figuring required to determine gage block combinations and completely eliminates the somewhat tedious "last figure elimination process" with its unavoidable calculations.

The Height-Combination Tables list directly the blocks to be used, in forming combinations for each dimension in the range of .0001" to .9999" in steps of .0001", a total of 10,000 different dimensions. More helpful still, two alternative or "substitute combinations are listed for each dimension, giving the reader a choice of three combinations for each dimension. The latter feature is obviously an invaluable aid in enabling the user to construct the desired dimension even when certain blocks required for the "initial" combinations are not available.

The Heat-Expansion Calculator gives the corrections that must be made in the height of combinations which will be used for checking parts (other than steel) at temperatures above or below 68 degrees F, the standard measuring temperature. Such corrections are made to compensate for the different coefficients of expansion of the gage blocks and the parts to be checked. Corrections for this difference are not required when constructing combinations for checking steel parts since the expansion coefficients of steel and the gage blocks are virtually identical. With the Heat-Expansion Calculator and the accompanying table of coefficients, the amount of correction for every kind of material and the specific size being checked is simply read right off the chart.



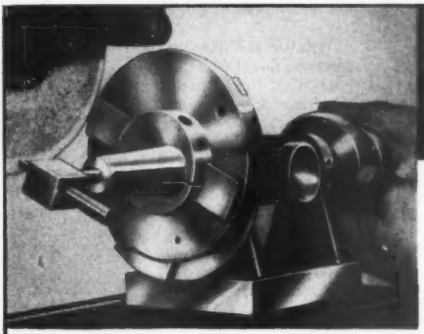
Use of the table and calculator may be learned in a few minutes from comprehensive diagrammatic instructions that appear before the respective sections.

New Surface Grinder

PDQ is a new type of surface grinding machine offering a unique and advanced grinding method. This new grinder is designed for the fast and accurate generation of flat surfaces on various kinds of metal parts including cast iron, steel, tool and stainless steels, die castings of aluminum and zinc, and bronze and alloys of various kinds. It is also adaptable to the grinding of plastics, ceramic parts, glass and other materials requiring rapid stock removal and flat surfaces.

The unusual principle employed in the PDQ grinder consists of a cylinder type grinding wheel mounted in a vertical plane and recessed within the actual work surface of the table. The machine employs a large 12" diameter cylinder type wheel, and permits the finishing of surfaces as wide as 9½" of any reasonable length or height. The extreme ease of operation and simplicity of principle eliminates the need for magnetic chucks and various holding fixtures normally needed. Exceptional speed is possible as the work pieces are simply passed across the face of the grinding wheel while the amount of stock removal is regulated by means of a positive feed control governing the depth of cut.

The front section of the work-table is removable to permit the grinding of parts having side obstructions or angular surfaces which could not ordinarily be machined on a flat bed type surface grinder. When extra width capacity is required, the entire guide fence may be raised. Available equipment includes complete dust removal and coolant systems for wet or dry grinding.



FAMOUS
SAMSON
Offset
BORING CHUCKS

PRECISION WHEEL DRESSING SIMPLIFIED!

THE LAST WORD IN . . .

- Angle tangent to radius wheel dressing
- Simplicity of setting
- Shortens dressing time
- Dresses grinding wheel at point of contact
- Rugged for long life

WRITE FOR COMPLETE DETAILS

LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

APEX INSERTED-BLADE METAL-CUTTING TOOLS

APEX TOOL BITS FIT MOST STANDARD HOLDERS

A type for every job

If you haven't yet changed to Apex, you can begin to get acquainted by using Apex Bits in your present holders. The Apex line includes Single-Point Round Shank (as shown) and Shankless Serrated — plus Inserted-Blade Milling Cutters of all different styles. Prompt shipments from our large stock. Write for catalog.

APEX TOOL & CUTTER CO., Inc. **SHELTON 17, CONN.**

Use free Inform-A-Gram Card for fast service

QUICK-PIC

FURNACES

Lindberg-Fisher two chamber induction melting furnaces concentrate casting equipment in your plant, open numerous paths to better casting procedures.

Circle No. E5.

CAMS & TOOLS

Cams and tools for automatic screw machines described in catalog 9 from Amcam. Complete job requirements provided in one package.

Circle No. E6.

MOTORS

Squirrel-cage induction motors for adverse operating conditions range from ½ to 100 H.P., featured in bulletin 51B6210D from Allis-Chalmers Company.

Circle No. E1.

DUPLICATING

Hydraulic duplicators permit close-tolerance, high speed machining using standard equipment and unskilled manpower. Applications discussed.

Circle No. E2.

ELECTRIC TOOLS

"Multi-Cycle" tools of eight different types are covered in Ingersoll-Rand bulletin. Over 100 sizes with complete accessories and equipment; models are listed.

Circle No E9.

SMALL CUTTERS

Woodruff & Stokes specialize in producing small tools to individual requirements. New bulletin gives all details of this unique service, with examples.

Circle No. E10.

"FEED-O-MATIC"

Trade name of V & O Press Co., for device for automatic press feeding. Index table and exclusive safety features give big boost to production potentialities.

Circle No. E3.

SPRING DESIGN

Sandsteel springs have "cross" or two-way curve for better performance and reliability. Interesting bulletin "Sandsteel Springs for Dual Power."

Circle No. E4.

DRUM SANDER

8" diameter by 2" wide Cone-Loc drum sander is now available, completing size range. This balanced precision tool eliminates the need for costly endless belts.

Circle No. E11.

ANGLE GRINDING

Weldon sub-base for grinding clearance angles on end-mills gives simple and fast sharpening with absolute accuracy. Will adapt to any tool grinding machine.

Circle No. E12.

JIG BORER

"Hydroptic 6" is new jig borer imported by Cosa Corp. from Switzerland. Visual setting by means of viewing screens gives guaranteed accuracy, cuts time.

Circle No. E7.

SPEED GAGING

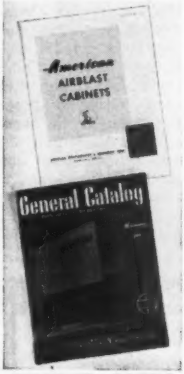
Automatic gaging methods by electro-mechanical and electronic systems combine flexibility and speed. New Federal Bulletin.

Circle No. E-8.

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

CATALOGS

Use free Inform-A-Gram Card for fast service



AIRBLAST CABINETS
Catalog 31-A details complete range of cleaning cabinets in different sizes. Both suction and pressure type models are available.
Circle No. E-13.

MACHINERY
Complete line of Gorton products is described in catalog now available. Milling, profiling, die sinking, and engraving machines among those featured.
Circle No. E14.

SHEET CLAMPING
3H safety lock sheet metal clamps give maximum speed of operation and maximum protection for worker. Range covers every need.
Circle No. E15.

STRIP HANDLING
Fried strip conveyors, stackers and positioners offer a complete solution to operator fatigue and high accident rate at the shear. Accuracy bettered.
Circle No. E16.

CYLINDER POWER
"Cylinder Power in Action" new Hanna bulletin illustrating cylinder power movements with 21 application photos. Factual information is of great value.
Circle No. E17.

"COOLUBRICATION"
Milford "Atom-Lube" directs atomized mixture of air and lubricant right onto tool cutting edge. This is economy shaking hands with quality performance.
Circle No. E18.

PRE-SETTING GAGES
Scully-Jones line described and illustrated in new catalog No. 19-50. Section on multi-spindle machine gages especially interesting.
Circle No. E19.

PUNCHING, NOTCHING & NIBBLING
Wales catalog 10A details sheet metal fabricator with high capacity and performance, includes "Hydra-New Matic" head.
Circle No. E20.

CARBIDE PRODUCTS
Carbide cutting tools and blanks featured in 48 page Wesson catalog. Exclusive band locking device is featured for applications in heavy-duty machining.
Circle No. E21.

CASTING SERVICE
Facilities of the Production Pattern & Foundry Co., given in new brochure. New process cuts contract costs yet retains first class tolerances and finishes.
Circle No. E22.

CUTTING TOOLS
Gairing standard cutting tools are given exhaustive treatment in new catalog. Special arrangement gives easy reference for ordering. Also section on specials.
Circle No. E23.

GRINDERS
Reid precision grinders embodies general excellent engineering, also has variable table speeds. New catalog on the model 618 grinder.
Circle No. E24.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

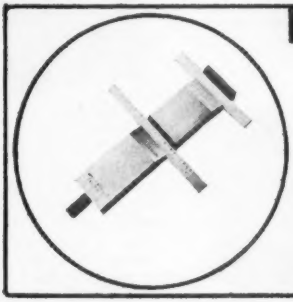
Hardening Costs Cut

A 48 per cent reduction in the cost of hardening basket shafts for use in washing machines has resulted through the use of two 15-kw electronic induction heaters at the Syracuse, N. Y. plant of the Easy Washing Machine Company.

According to the general foreman of Easy's Heat-treat Department, the entire cost of the hardening process, including labor, power costs, repairs, depreciation and overhead, has been reduced from 13 cents to 6¾ cents per basket shaft.

Before adopting the induction heater method, the firm hardened the shafts with a cyanide process. In addition to the cost of the chemicals, this process took three shifts of two men to harden 1600 shafts. Now one man is able to accomplish the same thing in one eight hour shift, allowing the company to transfer five valuable men to other more productive posts.

The company also reports better hardness characteristics than were achieved under the old process. The equipment allows exact and automatically controlled heating and quenching times, resulting in uniform hardness. The heaters also supply selective heating for soldering, brazing, and annealing.



EASY • QUICK • ACCURATE

KOENIG
— TWO SEAT —
Vernier Depth Gauge

Easy, quick and accurate measurements. Unlimited use due to compact design. End-slotted head makes difficult measurements easy. Machine divided graduations to read in thousandths of an inch.

Hardened, ground and lapped head—¾"x1⅝"x2¾" End-hardened, tool steel scales—3/32"x ¼" wide. All scales allow full length to 8". Hook scales of any size available.

Descriptive Literature Available
WM. A. KOENIG
108 MT. VIEW AVENUE. TROY, NEW YORK

EFFICIENT ECONOMICAL
ROUGH GRINDING AND FINISH GRINDING
NEAREST THING WE KNOW TO A DIAMOND WHEEL
FOR PRECISION AND OFFHAND GRINDING

New XL BOND
FOR CARBIDE TOOL AND CUTTER
GRINDING

"XL" is Chicago Wheel's exclusive new bond for silicon carbide vitrified grinding wheels, especially made for grinding carbide cutting tools. Supplied in most popular sizes and steel backs. Prompt delivery. Keep your production up . . . costs down, with "XL."

Write today for information—Dept. TP

CHICAGO WHEEL & Mfg. Co.
1101 West Monroe St., Chicago 7, Illinois
OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

FOR PRODUCT INFORMATION USE INFORM-A-GRAM CARD

SOLD THRU LEADING SUPPLY HOUSES

GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing cut that eliminates all chatter.

SEND FOR CATALOG AC1.

GROBET FILE CO. of AMERICA, INC.

421 CANAL STREET N. Y. 13, N. Y.

Plants: New York, Chicago, Montreal

Miccro Supreme

LAY-OUT AND IDENTIFICATION DYE

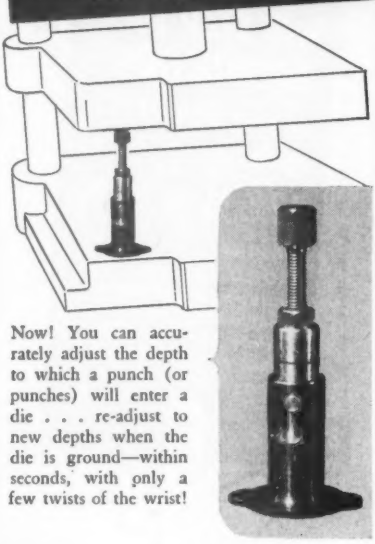
7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

MICHIGAN CHROME & CHEMICAL COMPANY

6340 E. Jefferson Ave. • Detroit 7, Mich.

The KE-VO—Revolutionary Die Depth Gage!



Now! You can accurately adjust the depth to which a punch (or punches) will enter a die . . . re-adjust to new depths when the die is ground—within seconds, with only a few twists of the wrist!

Protect *all* your blanking, forming and drawing dies against damage due to over-striking or handling . . . increase their working life . . . slash die set-up time . . . and cut scrappage to a minimum—with the KE-VO Die Depth Gage! Permanently mounted on the die shoe, KE-VO adjusts in a jiffy to $4\frac{1}{2}$" high, $2\frac{9}{16}$" low. Unique design permits locking gage out of striking position when in production.

Only $2,25 plus postage

Order several KE-VO's for *all* your dies TODAY! Hundreds in use *prove* their value!

VOCAR MFG. & SALES

BOX 97, PROSPECT HTS., ILLINOIS

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

PROTECTRON
will STEP UP
PRODUCTION
of your present
equipment
12½% to 22%
because...
PROTECTRON monitors automatic machines continuously; they can safely operate even when the operator is away from machine.
PROTECTRON
Makes Money for you
in Two More Ways!
1. reduces tool & die breakage up to 86%.
2. gains up to 300% in manpower because 1 man can safely operate 4 machines.
Write... wire... phone for further information!
The Brinnell Company
SIMSBURY, CONN.

. . . Good Grinding, from page 114

Short centers and short drive pins with driving dogs as close to face plate as possible will remedy this condition.

The use of tungsten carbide tipped centers has been of great value. It is estimated that tungsten carbide will outwear other metal but must be handled very carefully. They cannot be subjected to shocks or sharp blows.

Centers made of other materials such as high speed steel or tool steel should be tested for hardness before using. The test can be made with a fine file. If it is not "glass hard", do not use it.

The care and storage of centers is very important. They should be used and handled as carefully as the finest tool or equipment. They should be correctly ground and stored in convenient racks so that operators can make proper selections. Centers should be carefully inspected for wear and flaws before being made available to operators.

When regrinding centers, care should be taken not to heat or burn the surface. It will soften the outer surface and also cause fractures. All centers should be tested for hardness before placing them in operator's racks.

When lubricating centers for small parts that are quickly finished, ordinary machine oil is sufficient. For larger heavier work, a mixture of white lead and heavy-way lubricating oil should be used. There are also several special center hole lubricants on the market that are very efficient.

Never use red lead, cup grease or 600W oil.

The basic points for all operators to remember are:

1. Clean lapped center holes.
2. Hard centers ground 60°+11 to 13 minutes.
3. Headstock center short as possible.
4. The least possible footstock spring pressure to assure safe, accurate work.
5. The use of the best grade of center hole lubricant procurable.

Come next November your one vote just won't be enough. It'll take your neighbor's, your co-worker's, and your mother-in-laws to get us out of the trouble we're in! A mere 51% won't be enough! See page 59. E. W. P.

Tomco

HAND WHEELS
HAND KNOBS
MACHINE HANDLES
HANDLES
BALL HANDLES
SPECIALTIES

Write for literature

Tomco PRODUCTS CO.
1633 DOUGLAS AVE.
RACINE • WISCONSIN

Blank or Machined – from stock

For PRECISION FINISHES on CARBIDE, TOOLS, DIES, Etc.

and

MIRROR FINISHES

. . . in minutes instead of hours

"MICRO MESH"

PURE DIAMOND LAPPING COMPOUND

WILL SOLVE YOUR LAPPING PROBLEMS

write for details

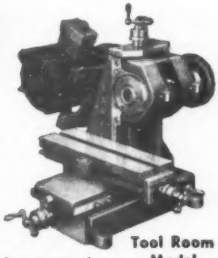
A-1 ABRASIVE LABORATORIES
139 DUANE STREET NEW YORK 13, N. Y.

The BARKER "MILLER"

Will Efficiently Handle "101 TRICKY"

Second Operation Jobs on SMALL PARTS ordinarily requiring larger, expensive milling machines

Production Model



Tool Room Model
3 Micrometer feed screws. Ideal for instrument mfgs. and tool and die shops.

The Barker exclusive 3-way travel feature affords versatility of operation.
Rapid production rate with inexperienced help. Easy set-up for small run jobs.
Compare Barkers "plus" features with other small "millers," then decide.

TYPICAL END MILL OPERATION UTILIZING HEAD MOVEMENT ONLY

WRITE FOR LITERATURE AND COMPLETE INFORMATION

BARKER ENGINEERING COMPANY 500 GREEN ROAD CLEVELAND 21, OHIO

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

NEW!

Wide Range— Variable Speed 16" Precision Drilling Machine

Here's a drill press that will save you time and produce finer work. With this machine you don't have to stop the motor to change spindle speeds. You don't have to bother with belts, belt covers, and slow-speed attachments. You can work with the correct speed and minimize scrapped work.

Speeds of 150 to 4000 RPM Available at Fingertip

You merely set the pointer of the dial to the correct spindle speed and go to work. Adjustment can be made during actual operation to obtain efficient cutting or eliminate chatter.

FREE DATA on this outstanding new drill press will be sent upon request. Ask for Bulletin TP-4.

The ELECTRO-MECHANO Co.

260 EAST ERIE STREET

MILWAUKEE 2, WISCONSIN

Versatility In Small Space

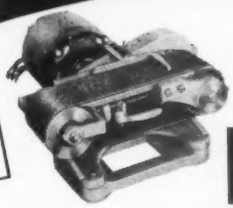
An amazingly versatile and compact machine tool, the Hommel Universal Multi-Purpose Machine, has just been introduced into this country. It can be used to machine the most complicated work-pieces on all sides, usually without changing the original position.

With its various attachments, the Hommel can be used for precision turning, facing, milling, grinding, drilling, planing, jig boring, polishing, slotting, and a variety of other jobs. With all its many working possibilities the Hommel remains a remarkably simple machine to operate. The accessories are made with a high precision finish that assures accuracy, even when used by semi-skilled workers.

Rigidly braced, the base plate is reinforced with an internal steel traverse, set on rubber feet, and can also be used as a tracing plate and measuring table. The drive system can be set up for 25 different spindle speeds, and combines easily in any position necessary for the various jobs. The spindle headstock has self-adjusting roller bearings, and the spindle bore fits the face plate and three jaw chuck with the same dimensions as the dividing head, enabling clamping devices to be interchanged without resetting the work-pieces.

A comprehensive 128 page instruction book accompanies the machine, describing 45 different assemblies for working operations, spindle speeds, gearing and thread charts.

DOES IT BETTER... DOES IT FASTER



OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING WRITE TODAY

SIMPLEX-M
ABRASIVE BAND GRINDER

The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

WALLS SALES CORP.
333 Nassau Avenue, Brooklyn 22, N. Y.

OPTICAL COMPARATOR EQUIPMENT

.... Send for FREE CATALOG No. 51-1952 on comparator charts and accessories.

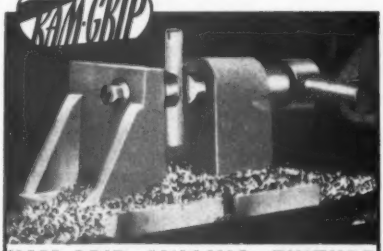
Submit prints for prompt review and cost on special inspection layouts.

WE DESIGN AND BUILD SPECIAL HOLDING DEVICES AND FIXTURES FOR USE ON COMPARATORS.

ANALYSIS WITHOUT COST TO YOU

GAGE COMPANY
BATTLE CREEK, MICH.

Hanchett KAM-GRIP



KAM-GRIP MILLING FIXTURE

Versatile—Low in Cost

These are reasons for its great demand in the defense program and industry:

- Speedy Loading and Unloading
- Fast Clamping Action
- Rigid Gripping Power

Plus Automatic Action when it's used for drilling, tapping, reaming and other operations on the drill press.

Write for free catalog and operational details.

MANUFACTURERS ENGINEERING SERVICE
405 Security Building, Toledo, Ohio

HARDENED and GROUND HSS BLANKS

Any decimal diameter to ⅝"—in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

Write or Phone ORange 3-4301 for price list D-3

WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

A "Peacetime" Drawing and Forming Press

This 300-ton hydraulic press was specially built for a leading manufacturer of farm implements. Designed for the making of plow beams, the press has a special hydraulic circuit with two pressure cycles in one. Operation is by remote electronical control. There are two foot switches. The ram is made to exert a low tonnage by activating one foot switch, and a high tonnage by activating the other foot switch. The plow beams are bent to a specific angle at low tonnage, and are then turned for flattening at high tonnage.

The press is arranged for pressure reversal as well as position reversal. At front of the press, within convenient reach of the operator, a simple crank handle for operation of limit-switch controls is located at the left, and inching-down handwheel at the right. The inching-down handwheel permits operator to move the platen down as little as $\frac{1}{16}$" at a time. This is a great aid to precise control in die-setting. A desirable safety feature is a thermostat in the reservoir which will automatically stop press operation if the oil should reach a critical temperature.

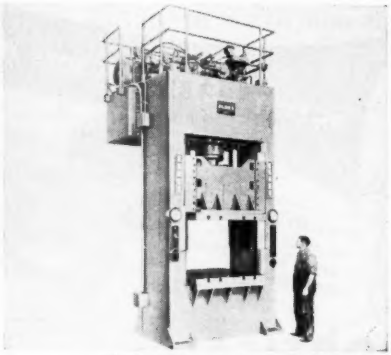


Photo courtesy: American Steel Foundries, Elms Engineering Division

This press is typical of "custom engineering"—the development of hydraulic equipment specially designed to meet the user's particular production requirements.

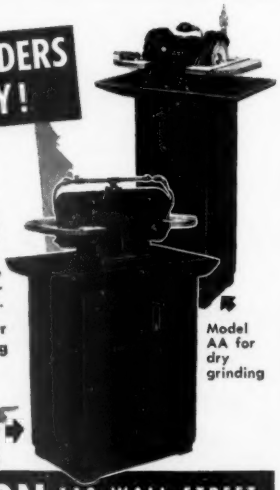
PROSSER CARBIDE TOOL GRINDERS SAVE TIME — SAVE MONEY!

Prosser grinders are outstanding for speed, accuracy, thrift and are available in a wide range. Famous Prosser indexing device permits instant, accurate angle setting that "stays put". Easy adjustment permits virtually 100% use of wheels. For grinding carbide, high speed steel, stellite and other modern tools, with any combination of diamond, silicon carbide or aluminum oxide wheels. Wet or dry models.

Designed by Prosser — originator of cemented carbide for American industry — these efficient grinders are ruggedly constructed to serve you dependably for years.

PROMPT DELIVERY. Send for catalog of floor and bench models, chip breaker, drill-grinding and other attachments.

DEALERSHIPS AVAILABLE.



Model AA for dry grinding

Model EE for wet or dry grinding

THOMAS PROSSER & SON 118 WALL STREET, NEW YORK 5, N. Y.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

HEIMANN MFG., CO. • URBANA, OHIO

This **DIE BOOK**

CONTAINS CONDENSED PRACTICAL AIDS FOR EXPERIENCED

DIE MAKERS

Answers to Over 1000 Practical Die Problems With Use of Direct Reading Tables and Formulas

ALL IN ONE COMPACT HANDBOOK . . . direct answers to die problems. Saves time. Eliminates mathematical calculations. Avoids costly errors. Contains invaluable formulas and tables for quick reference.

Formulas and Direct Reading Die Tables on the following types of dies: Bending and Forming Dies, Blanking Dies, Drawing Dies, Square and Rectangular, Drawn Shells, Miscellaneous Tables and Charts.

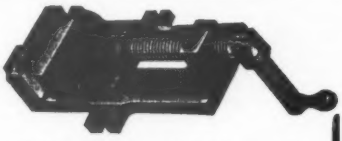
Write for Bulletin 88—Money Back Guarantee—Ten Days' FREE Examination.

DIE TECHNIQUES

Publishers: 5005 W. Lake St., Chicago 44, Ill. Please send on approval Condensed Practical Aids for Die Engineers, Designers and Die Makers.

☐ Enclosed $3.50 for one book
☐ Enclosed ($3.00 each for 6 or more)

Name _____
Firm _____
Address _____



YOST DRILL PRESS VISE

● This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	6	5½	23

Do you need a vise of ANY type?

Write today for bulletin on the extensive Yost line

YOST MFG. COMPANY
1000 MAIN STREET
MEADVILLE • PENNSYLVANIA

Specify DESTACO **SHIM STOCK**

Made from selected steel or brass, rolled to precision limits, oiled to resist stain and rust, free from burrs. Twelve assorted thicknesses .001" to .015", sheets 6" x 12"; coils 120", identified every 6" by thickness and amount remaining on roll.

DESTACO **DETROIT STAMPING COMPANY**

344 MIDLAND AVENUE • DETROIT 3, MICHIGAN

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

— CONTRACT TOOLING AND PRODUCTION —

Illinois

DRESEL-BETZ CO.
Belleville, Ill.
Designers and Manufacturers of Tools, Dies, Jigs, Fixtures, Metal Stampings.

Michigan

DAVIS TOOL AND ENGINEERING CO.
19250 Plymouth Road, Detroit, Michigan, VErmont 5-6000. Tools and Dies, Special Machinery. Sheet Metal Stampings and Assemblies.

New York

CAZENOVIA
PRECISION MACHINE CO., INC.
669 Oakwood Avenue East Aurora, N. Y.
Telephone: 1561
Special Machinery • Tools and Gages
Small Lot Production
Design & Engineering Facilities Available
Precision Hand Scraping

AMERICAN MEASURING INSTRUMENTS CORP.
The AMIC Bldg., 21-25 44th Ave., Long Island, City 1, N. Y. Jigs, fixtures, gages, dies, precision parts.

CONRAD & MOSER
2-23 Borden Ave., Long Island City, N. Y. Machine Tools & Molds, Parts & Machines Aluminum Cast Parts, Aluminum Sheet Formed Housings.

Ohio

CLEVELAND UNIVERSAL JIG COMPANY
12404 St. Clair Ave., Cleveland, O., MUlberry 1-2400
DESIGNERS AND BUILDERS
Jigs and Fixtures Special Machines
Production Engineering
Complete Plant Routing and Tooling

GENERAL DIE & TOOL CO.
2067 W. 55th St., Cleveland, O., WO 1-4736 Dies, Tools, Jigs, Fixtures, Light Stampings, Special Machinery Manufacturing.

H & P DIE STAMPING CO.
13947 Triskett Rd. Cleveland 11, Ohio
PRECISION DIES, JIGS & FIXTURES
Quality Stampings
Bus & Trailer Parts

THE INDUSTRIAL MACHINE CO.
1436 East 47th St., Cleveland, O. Founded in 1908. Builders of Special Machinery. General Machine Work.

KIFFER TOOL & DIE CO.
5601 Tillman Avenue, Cleveland, Ohio, WOodbine 1-2440 & 1-2441. Manufacturers of Special Machinery, Tools, Dies, Jigs, Fixtures, Swiss Jig Boring.

NOBLE & STANTON, INC.
998 Broadway, Bedford, Ohio, Bedford 2-1234. Tool Makers—Short Run Production Work.

THE PHOENIX MACHINE CO.
2711 Church Ave., Cleveland, O., CHerry 1-1048. Contract Grinding, Boring and Planing. Lester-Phoenix Die Casting and Plastic Molding Machines.

A. P. SCHRANER & CO.
3338 Payne Ave., Cleveland, O., HEnderson 1-8644. External Cylindrical Lapping Machines, Special Machinery, Tools, Dies, Jigs, Fixtures.

PREIS . . .

ELECTRO-MARKER

for electrical marking on soft or hardened steel, alloy steels, or other ferrous materials. Excellent for mark-'ng finished and ground surfaces.

PANTO

Write today for literature.

H. P. PREIS ENGRAVING MACHINE CO.
647 Route 29 Hillside, N. J.

DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Penna.

Every tool room needs Champion

"HI-ROCKWELL" DRILLS

These tools drill precision holes in steels testing C-40 to C-68 Rockwell quickly, cleanly and without annealing. Ideal for reworking tools and dies. They actually cut a curled chip.

CHAMPION "HI-ROCKWELL" drills have reduced the drilling (a costly job), of that "forgotten hole" in an expensive hardened die fixture or plastics mold.

AVAILABLE IN STANDARD SIZES FROM STOCK

Write for free booklet.
We also manufacture the NU-MIKRO piston grooving tool.

CHAMPION TOOL CO.
BOX 463 — FARMINGTON, MICHIGAN

Use

KIPP AIR GRINDERS

if you want to GRIND —not just rub!

MODEL JA
50,000 R.P.M.

$42.00

IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. Every mechanic knows this, but inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

Buy Kipp air tools for best results, lower prices.

MADISON-KIPP CORP.
212 Waubesa St., Madison, Wis., U.S.A.

- *Skilled in* DIE CASTING *Mechanics*
- *Experienced in* LUBRICATION *Engineering*
- *Originators of Really High Speed* AIR TOOLS

SEE ADVERTISERS INDEX, BACK OF BOOK, FOR KEY NUMBERS

ADVERTISERS INDEX

and INFORM-A-GRAM Numbers for ADVERTISER'S PRODUCTS, AUGUST, 1952

A-1 Abrasive Laboratories 191B
Ace Drill Bushing Company, Inc. 161A
Acme Industrial Company 146C
Acro Metal Stamping Co. ..... 177A & 177B
Aget-Detroit Company 168B
Air-Mite 124
Alina Corporation 169A
Allegheny Ludlum Steel Corp 2
Allen Company, The A. K. 200B
Allen Mfg. Co. 109
American Measuring Instruments Corp. ..... 146A & 196D
American Photocopy Equipment Co. 153
American Wheelabrator & Equipment Corporation 17
Apex Tool & Cutter Co. 185B
Arrow Tool & Reamer Co. 134
Atlas Press Company, Clausing Division 48
Atrax Company, The 8
Austin Industrial Corp. 96

Balas Collet Mfg. Co. 1
Barker Engineering Co. 191C
Barnes Company, Inc., W. O. 141
Barth Stamping & Machine Works, Inc. 51
Baumbach Mfg. Co., E. A. 83
Bay State Abrasive Products Co. 46
Benchmaster Mfg. Co. 35
Bokum Tool Company 122
Boyar-Schultz Corporation 165A
Brinnell Company, The 190
British Industries Corp. 101
Brown & Sharpe Mfg. Co. 145
Buhr Machine Tool Co. 103

Carboloy, Dept. of General Electric Co. 115
Carborundum Company, The 40
Cazenovia Precision Mach. Co., Inc. 196C
Champion Tool Co. 197C
Chicago Screw Co., The 163B
Chicago Wheel & Mfg. Co. 188B
Cincinnati Milling Machine Co., The 79
Cincinnati Shaper Co., The 6
Cleveland Grinding Machine Co., The 131
Cleveland Universal Jig Co. 196F
Colonial Bushings, Inc. 157B
Columbia Tool Steel Co. 146B
Conrad & Moser 196E
Cosa Corporation 42

Dahlstrom Mfg. Co. 181A
Danly Machine Specialties, Inc. 19
Davis Tool & Engr. Co. 196B
Dayton Rogers Mfg. Co. 123
Detroit Die Set Corp. 111
Detroit Power Screwdriver Co. 30
Detroit Stamping Company 178B & 195D
DeVlieg Microbore Co. 113
Dickerman Mfg. Co., H. E. 25
Die Supply Company, The 119
Die Techniques 195B
DoAll Company, The 10
Dreis & Krump Mfg. Co. 179B
Dressel-Betz Company 196A
Drillunit, Inc. 43
Dumore Company, The 201
Durant Tool Supply Co. 171B
Dykem Company, The 157D

Eisler Engrg. Co., Inc. 161C
Electro-Mechano Co. 192
Enco Mfg. Company 183A
Erickson Tools, Div. of The Erickson Steel Company 38
Ex-Cell-O Corporation 5

Famco Machine Co. 120
Fray Machine Tool Co. 45

Gage Company 193B
Gatco Rotary Bushing Co. 139
General Die & Stamping Co. 196G
Gemco Shaper Co. 108
Globe Industries 180C
Globe Trading Company 160
Graymills Corporation 175A
Green Instrument Company 159A
Grobet File Co. of America, Inc. 189A

H & P Die Stamping Co. 196H
Handy Products Co. 199
Hamilton Tool Co., The ..... 95 & 99
Hardinge Brothers, Inc. 12
Haskins Company, H. G. 181B
Heimann Mfg. Co. 195A
Heuser Mfg. Co. 157C
Holliday & Company, W. J. 89
Hovis Screwlock Company 32
Huebner Publications Inc. 148
Hutchinson Company, Wm. T. 193D

Ideal Industries, Inc. 129
Industrial Machine Co., The 196J
Ingersoll Milling Machine Co., The 29

Jergens Company, J. G. 133
Jergens Tool Specialty Co. 58
Johnson Manufacturing Corp. 22
Jones & Lamson Machine Co. 27

Kempsmith Machine Co. 23
Kiffer Tool & Die Co. 196K
Koenig, Wm. A. 188A

Lamina Dies & Tools, Inc. 202
Last Word Sales Co. 185A
Latrobe Electric Steel Co. 107
Lee Company, K. O. 130
Lees-Bradner Co., The 44
Lempco Products Inc. 9
Lepel High Freq. Labs., Inc. 7
Levin & Son, Inc., Louis 87
Lincoln Park Industries, Inc. 49
Lockheed Aircraft Corp. 140
Lucas Machine Div. The New Britain Machine Co. 35
Lucas-Milhaupt Eng. Co. 121
Lucas & Son, Inc., J. L. 180B

Madison-Kipp Corporation 197D
Manufacturers Engrg. Service 193C
Mead Specialties Co. 167A
Meyers Co., Inc., W. F. 128
Michigan Chrome & Chemical Co. 189B
Micromatic Hone Corp. 117
Miller Motor Co. 36
Minnesota Mining & Mfg. Co. 106
Montgomery & Co., Inc. 169B
Moore Special Tool Co., Inc. 54
Morey Machinery Co., Inc. 183B
Morton Machine Works 116
Motch & Merryweather Co., The 132

National Tool Salvage Co. 138
Neise, Karl A. ..... 161B & 169D
Newage International, Inc. 126
New-Field Machined Parts Co. 56
Nichols-Morris Corp. 26
Noble & Stanton, Inc. ..... 150 & 196L
Northwestern ..... 161D & 179C

Oliver Instrument Co. 171A
O'Neil-Irwin Mfg. Co. 81
Ohio Nut & Bolt Co. 147

Parker-Kalon Corp. 21
Perfex Gage & Tool Co. 140
Phoenix Machine Co., The 196M
Porter Precision Products 50
Pratt & Whitney, Div. Niles-Bement-Pond Co. 62
Precise Products Co. 133
Preis Engraving Machine Co., H. P. 191A
Producto Machine Co., The 31
Prosser & Son, Thomas 198
Putnam Tool Co. 3
Pratton Machinery Co., D. H. 35

Raymac Manufacturing Co., Inc. 176A
Reid Tool Supply Co. 180A
Rice Pump & Machine Co. 180D
Richards Company, J. A. 168A
Rimat Tool Company 156B
Ring Punch & Die Co. 166B
Rivett Lathe & Grinder, Inc. 28
Roll-Feeds Corp. 176A
Rotor Tool Co., The 28
Royal Oak Tool & Machine Co., D-S Grinder Division 24

Sales Service Machine Tool Co. 33
Scherr Co., Inc., George ..... 157A & 176B
Schraner & Co., A. P. 196N
Scully-Jones & Co. 33
Service Machine Co. 174A
Severance Tool Industries, Inc., ... 174B
Sheldon Machine Co. 127
Shore Instrument & Mfg. Co., Inc., The 176C
Sid Tool Company, Inc. 142
South Bend Lathe 31
Standard Electrical Tool Co., The 200A
Standard Pressed Steel Co. 39
Steel Products Engrg. Co. 144
Strand Co., Edward D. 169C
Strand Mfg. Company 176B
Superior Steel Products Corp. 34
Swedish Gage Co. of America, C. E. Johansson Gage Co., A Division 161E

Tannewitz Works, Inc. 137
Thermo Electric Mfg. Co. 155A
Tietzmann Tool Corp. 179C
Timken Roller Bearing Co., The Steel and Tube Division 33
Tomco Products Co. 191A
Tomkins-Johnson Co., The 31
Tubular Micrometer Co. 36
Twentieth Century Mfg. Co. 169E & 176E

U. S. Tool Co., Inc. 37
Universal Engineering Co. 37

Victor Machinery Exchange, Inc. 162A
Vocar Mfg. & Sales 196C

Wales-Strippit Corp. 14
Walker Hydraulic Duplicator Co. 37
Walls Sales Corp. 192A
Watts Brothers Tool Works 197B
Weldon Tool Co., The 136
Wells Mfg. Corp. 135
Wesson Co., Affiliated with Wesson Metal Corp. 40
West Point Mfg. Co. 16
Whistler & Sons, Inc. S. B. 186
Whitney Metal Tool Co. 167B

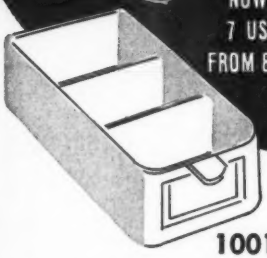
Yost Mfg. Company 196C

Zagar Tool, Inc. 162

INFORM-A-GRAM KEY NUMBERS

SMALL PARTS CABINETS

NOW AVAILABLE IN
7 USEFUL SIZES—
FROM 8 TO 64 DRAWERS



1001 Time-Saving Uses For Home and Business!

Ideal for small parts...washers...nails...screws...bolts...nuts...drills ...taps...carbide tips...mounted points...tools...brads...tacks...and YOU NAME IT!

All-metal JIFFY Cabinets have a sturdy steel frame with hammered aluminum finish in silver-gray color.

Drawers are of solid aluminum, measuring 1¼" high, 2¾" wide and 5¾" deep. Individual metal drawer guides keep the drawers in a free-sliding position.

Each JIFFY Cabinet is supplied with its full requirement of removable drawer-dividers and index labels.

CLIP AND MAIL

TO: HANDY PRODUCTS
P.O. BOX 2447, CLEVELAND 12, OHIO

PLEASE SEND IMMEDIATELY THE QUANTITY AND SIZE JIFFY UNIT LISTED BELOW

☐ 64 Drw. @$24.95* ☐ 48 Drw. @$19.95* ☐ 32 Drw. @$12.95* ☐ 24 Drw. @$9.95* ☐ 16 Drw. @$7.95* ☐ 12 Drw. @$6.95 ☐ 8 Drw. @$4.95*

WE PAY ALL SHIPPING COSTS

FIRM .....

ADDRESS .....

CITY ..... State .....

ORDERED BY ..... DEPT. .....

Please Ship as Follows:

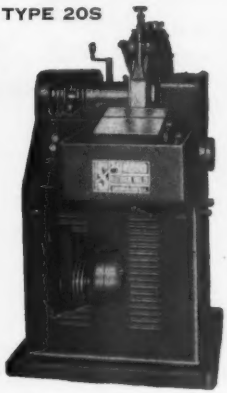
☐ Open Account, Purchase Order Enclosed.

☐ Check or Money Order Enclosed

☐ C.O.D.

Ohio Customers Add 3% Sales Tax.

TYPE 20S



IDEAL FOR YOUR TOOL ROOM

STANDARD'S STRAIGHT WHEEL TOOL GRINDER

Standard's Type S Straight Wheel grinder with two spindle speeds maintains correct peripheral speed throughout wheel life. Wheels operating at the correct cutting speed last longer, reduce grinding time and lower wheel costs. Tilting (degree graduated) Table adjusts to wheel wear. Safety interlock prevents over speeding of wheel.

- Two Speeds
- Sizes: 14", 16", 18" and 20"
- Wet or Dry
- Ball Bearing

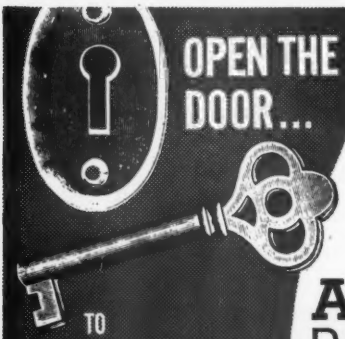
standardize with

Write for complete details today.

the STANDARD electrical tool co.

Mt. Hope and 6th Sts. Cincinnati 4, Ohio

OPEN THE DOOR...

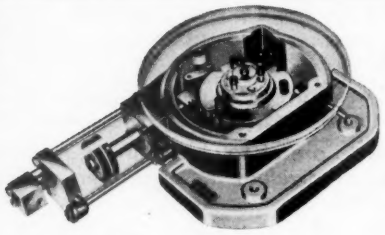


TO

INCREASED PRODUCTION

LOWER COSTS

GREATER DEPENDABILITY



ALLEN AIR OPERATED DIAL FEED TABLES

MODEL 11EA and 11EB

- Working Mechanism Completely Enclosed
- Rack and Gear Drive
- Clockwise or Counterclockwise Rotation
- Adjustable from 4 to 24 Index
- Guaranteed Against "Override"
- All Working Parts Flame Hardened

Please Write For Illustrated Brochure

THE A. K. ALLEN CO. AGENTS IN PRINCIPAL CITIES

57 MESEROLE AVENUE • BROOKLYN 22, N. Y.

FOR EXPORT: States Trading Co., 401 Broadway, N. Y., N. Y. Cable Address: STRADESO, N. Y.

For powerful grinding with a light touch... use DUMORE® Hand Grinders

MANUFACTURERS everywhere standardize on Dumore hand grinders. They're job-proved in over 100,000 industrial applications . . . where power-packed performance and perfect balance are appreciated. Easily adaptable to nearly every grinding job . . . from light "snagging" on castings to cleaning and deburring finished parts. Powerful Dumore motors, 1/40 to 1/4 hp, are continuous-duty rated. Armatures are dynamically balanced . . . ball bearings are especially selected and fitted. Dumores are precision tools, built to rigid tolerances and triple-inspected to maintain well-known Dumore quality.

There's a DUMORE for every job

Series 9 — ¼ hp; 15,500 RPM. ⅞" to 2½" wheels.

Series 10 — 1/10 hp; 22,000 RPM. ⅛" to ⅞" wheels.

Series 8 — 1/20 hp; 18,000 RPM. ⅛" to ⅞" wheels.

Series 3 — 1/14 hp; 17,000 RPM. For all sizes mtd. accessories.

Series 4 — 1/40 hp; 28,000 RPM. For ⅛" and 3/32" mtd. accessories.

Lightweight, compact and balanced to minimize vibration. Ample power for continuous, high-production duty. Five sizes—1/40 to 1/4 hp. Largest permits wide range of heavy-duty grinding. Smallest recommended for light industrial applications.

Ask your nearby industrial distributor for a demonstration of this quality line of Dumore hand grinders — or write

THE DUMORE COMPANY
1313 Seventeenth Street • Racine, Wisconsin

LAMINA GUIDE PIN BUSHINGS

BRONZE PLATED ON HARDENED STEEL

...now in two styles

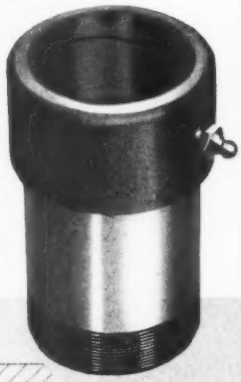
The bushing that gives you the long-wearing features of harden steel yet provides the seize-fr score-free performance of soft bro is now available in the two sty at the left.

The Lamina Guide Bushing hardened steel with free-runni bronze electroplated on the ins diameter. A ½" oil groove tur lubricates the inside of the bush in a double figure-eight patte Ordinary grease is fed to the gro through a standard Alemite fitti

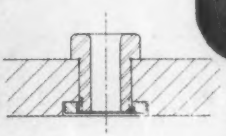
In addition to the improved we ing qualities of the Guide Bu ings, Lamina Guide Pins g longer service, too. Made of wa hardening tool steel, these p eliminate the brinelling e "mushrooming" characteristic case-hardened pins when dr into the die shoe.

Both styles of these bushing stocked in a variety of len and diameter for straight, sh der and removable pins. La **Dies and Tools, Inc., 1423 Eleven Mile Road, Berkle Michigan.**

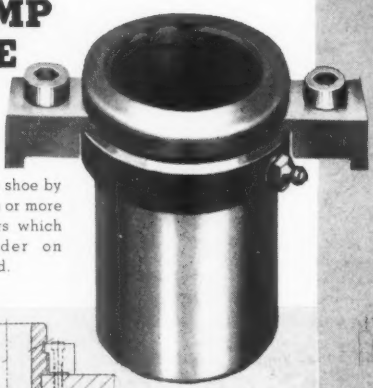
NUT TYPE



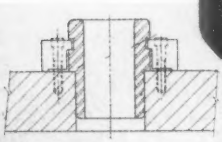
Is secured in shoe by tightening nut on end of bushing. Nut is located in counterbore in shoe for flush assembly.



CLAMP TYPE



Is secured in shoe by means of two or more clamp fingers which grip shoulder on bushing head.



DISTRIBUTORS: A few desirable territories are open to qualified distributors. If interested, please write for details.

PATENT PENDING

This new brochure fully illustrates Lamina facilities, dies, tools and die making equipment. Send for your copy, there is no obligation.

Lamina DIES AND T